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This Association of Chemists and Druggists and others interested in Pharmacy is managed by about twenty unpaid officers annually elected by the members.

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Extra copies of the Year-Book and Transactions for 1870 and subsequent issues, will be sent to members on receipt of Subscription as above, for each additional copy. To non-members, the price is Ten Shillings per volume, exclusive of postage.

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FROM JULY 1, 1897, TO JUNE 30,

1898.

WITH THE

TRANSACTIONS

OF THE

BRITISH PHARMACEUTICAL
CONFERENCE

AT THE

THIRTY-FIFTH ANNUAL MEETING

HELD AT

BELFAST,

AUGUST, 1898.

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THE BRITISH PHARMACEUTICAL CONFERENCE.

AN ORGANIZATION ESTABLISHED IN 1863 FOR THE ENCOURAGEMENT OF PHARMACEUTICAL RESEARCH, AND THE PROMOTION OF FRIENDLY INTERCOURSE AND UNION AMONGST PHARMACISTS.

THE most important ways in which a member can aid the objects of the Conference are by suggesting subjects for investigation, working upon subjects suggested by himself or by others, contributing information tending to throw light on questions relating to adulterations and impurities, or collecting and forwarding specimens whose examination would afford similar information. Personal attendance at the yearly gatherings, or the mere payment of the annual subscription, will also greatly strengthen the hands of the executive.

A list of subjects suggested for research is sent to members early in the year. Resulting papers are read at the annual meeting of the members; but new facts that are discovered during an investigation may be at once published by an author at a meeting of a scientific society, or in a scientific journal, or in any other way he may desire; in that case, he is expected to send a short report on the subject to the Conference.

The annual meetings are usually held in the provinces, at the end of July or early in August; that for 1899 will be held at Plymouth.

Gentlemen desiring to join the Conference can be nominated at any time on applying to the Secretaries, or any other officer or member. The yearly subscription is payable in advance, on July 1st. The amount, which includes free delivery of the Year-Book, is 7*s.* 6*d.* for members residing within the Postal Union. Further information may be obtained from

THE ASST. SECRETARY; BRIT. PHARM. CONF.,
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THE YEAR-BOOK OF PHARMACY.

The Conference annually presents to members a volume of about 500 pages, containing the proceedings at the yearly meeting, and an Annual Report on the Progress of Pharmacy, or Year-Book, which includes notices of all pharmaceutical papers, new processes, preparations, and formulæ published throughout the world. The necessary fund for accomplishing this object consists solely of the subscriptions of members. The Executive Committee, therefore, call on every pharmacist—principal, assistant, or pupil—to offer his name for election, and on every member to make an effort to obtain more members. The price of the Year-Book to non-members is ten shillings. The constitution and rules of the Conference, and a convenient form of nomination, will be found at page 271.

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INTRODUCTION.

IN briefly reviewing the leading contents of this volume we may fitly allude, in the first place, to the liquefaction of hydrogen recently accomplished by J. Dewar. The way to such a result had been gradually paved by notable successes which had attended similar experiments with other gases, including oxygen, nitrogen, and fluorine; and although hydrogen continued to defy all attempts at condensation, Olszewski's experiments conducted in 1895 afforded unmistakable indications that even this obstinate gas was certain to yield in due course. Its actual liquefaction has now been effected by subjecting it to the combined influence of a temperature of -205°C . and a pressure of 180 atmospheres, under which it assumed the form of a colourless liquid boiling at about -238°C . and having an approximate density of 0.07 at its boiling point. The condensation of helium has followed as the immediate outcome of this success, and was accomplished by immersing a tube containing the gas in the liquid hydrogen. These results are of the highest scientific interest, and may be said to mark an epoch in the annals of chemistry, inasmuch as they finally dispose of the idea of "permanent gases," which used to figure as a prominent dogma in chemical text-books.

P. G. Melikoff and L. Pissarjewsky record the interesting observation that a saturated ethereal solution of hydrogen peroxide and ammonia, when cooled to -40°C ., deposits a crystalline product containing ammonium peroxide. At the ordinary temperature, this compound reacts with hydrogen peroxide in such a manner as to yield ammonium hydrate and free oxygen, a decomposition strictly analogous to the well-known reaction between sodium peroxide and peroxide of hydrogen. R. L. Taylor confirms Schönbein's statement that the liquid obtained on decolorising an aqueous solution of iodine by the addition of ammonia possesses bleaching properties and imparts a blue colour to starch. He

further shows that solutions of the hydrates of potassium, sodium, calcium, and barium react with iodine in the same manner as ammonia, and that the bleaching action of the resulting liquids on indigo is due to the temporary formation of hypoiodites. The latter, owing to their instability, are soon decomposed, yielding iodides and iodates, a change which is greatly accelerated by heat. Per-carbonates, a new class of oxidising substances, are reported upon by M. Constan and A. von Haussen, who have obtained these bodies in the electrolysis of saturated solutions of alkaline carbonates at a low temperature. The potassium salt has the composition $K_2C_2O_6$, and is regarded as a neutral carbonate of potassium peroxide. It splits up, when heated, into potassium carbonate, carbonic anhydride, and oxygen, and decomposes water at the ordinary temperature with liberation of oxygen and the formation of potassium bicarbonate. A double iodide of lead and potassium of the formula $PbI_2 \cdot 2KI$ is described by F. C. H. Brooks, and is stated to break up into its components on being treated with water. On account of this property it is recommended as a delicate reagent for the detection of moisture, especially in such substances as ether or chloroform. The action of magnesium on cupric sulphate solution, which results in the evolution of hydrogen and the precipitation of a mixture of cuprous oxide and metallic copper, has been investigated by F. Clowes and R. M. Caven, and is also discussed in its theoretical aspects by E. Divers. M. François directs attention to the fact that pure mercurous iodide has a bright yellow colour resembling that of lead chromate, and that the greenish colour of the commercial salt is due to contamination with metallic mercury. A very satisfactory product, quite free from this impurity and also from mercuric iodide, may be readily prepared by precipitation. The same author also refers to the so-called mercurioso-mercuric iodide, Hg_4I_6 , which he finds to be not a definite compound, but a mere mixture of mercurous and mercuric iodides separable from each other by treatment with ether. The frequent occurrence of alkalis, sulphides, arsenic and other impurities in commercial samples of reduced iron is pointed out by E. S. Peck, who advocates the adoption of more definite official characters and tests for the purity of this preparation, and also discusses some of the methods employed for its assay. A very satisfactory and expeditious process for this assay published by E. Schmidt consists in a modified form of the iodine method, in which the percentage of metallic iron is deduced from the excess of free iodine determined

by titration. Compounds of iron, bismuth, mercury and other metals with alginic acid are described by E. C. C. Stanford, and shown to be admirably suited for medication in those cases in which it is desirable that the salts of these metals should pass through the stomach in an unchanged condition. He suggests the term "alginoids" as a general name for these combinations.

The gradual action of a cold mixture of equal volumes of sulphuric acid and water on pure solid potassium cyanide is shown by J. Wade and L. C. Panting to result in the evolution of anhydrous hydrocyanic acid in almost theoretical quantity. It therefore affords a convenient and expeditious means of preparing this acid in a pure condition. If, however, concentrated sulphuric acid be employed in the process, the liberated product appears to consist almost entirely of carbon monoxide. A report on ferrocyanide of zinc, by G. C. Stone and D. A. Van Ingen, supplies additional information on the variable composition of this compound, resulting from differences in the conditions under which it is precipitated. It is evident, therefore, that concordant results cannot be expected in the volumetric estimation of zinc by means of potassium ferrocyanide, unless the titration be always conducted on definite lines as regards temperature, proportion of free hydrochloric acid, choice of indicator, etc.

The part played by small quantities of ferrous iron in promoting the oxidation of tartaric acid by oxidising agents such as hydrogen peroxide, is again discussed by H. J. H. Fenton, who also calls further attention to the fact that dihydroxymaleic acid, the product of this oxidation, yields glycollic aldehyde on heating with water, and that this aldehyde readily condenses to a hexose. In his opinion, these changes are likely to afford information with regard to the natural formation of carbohydrates. The bearing of such changes upon the problems of plant physiology is likewise indicated by the results of an investigation carried on by C. F. Cross, E. J. Bevan, and C. Smith, respecting the action of hydrogen peroxide on carbohydrates. Here, too, the presence of traces of iron has proved to be an essential condition for the production of characteristic reactions. As another interesting contribution likely to throw additional light on some of the processes of plant life, we may refer to a new synthesis of glycerin which O. Piloty has recently effected by reducing dioxycetone with sodium amalgam. The starting-point in this synthesis is formaldehyde, which is now generally regarded as the first assimilation product of carbon formed from carbonic anhydride in the living plant, and capable of

yielding sugars and alcohols as condensation products. While alluding to recent synthetical successes, it may here be mentioned that a product identical with cane sugar in all its reactions and physical properties has been obtained by L. Marchlewski in the action of acetochlorhydrate on the potassium salt of *D*-fructose.

A. Forster and R. Riechelmann have investigated the basic constituents of coffee, and give an account of an alkaloid differing from caffeine by its insolubility in chloroform, its failure to give the murexide reaction, and by its forming a precipitate with picric acid. It may probably prove to be identical with Palladino's "caffearine." The same authors also deal with the estimation of caffeine in coffee; while processes for the determination of this alkaloid in tea are described by C. C. Keller, G. L. Spencer, and by A. Hilger and A. Juckenack. The estimation of theobromine in cocoa forms the subject of a report by L. Maupy. A further study of the constitution of theobromine, by E. Fischer, has led to the production of this base by a series of changes beginning with the conversion of synthetical γ -dimethyluric acid into dimethyldioxy-chloropurine. The new official test for the purity of quinine sulphate is adversely criticised by A. J. Cownley, who shows that a sample of this salt may contain an admixture of close upon 6 per cent. of crystallised cinchonidine sulphate and yet respond to the requirements of this test. In a paper read at the Belfast meeting of the British Pharmaceutical Conference, D. and D. L. Howard discuss the question as to the exact basicity of quinine, and point out that a precise decision on this subject is rendered difficult by the fact that theoretical considerations lead to a different conclusion from that deduced from the use of indicators in volumetric testing. O. Hesse supplies additional information respecting hydrocinchonine (Skraup's cinchotine), a cinchona base which was first recognised as an impurity in commercial cinchonine sulphate by Caventou and Willm. Its most profitable source appears to be the bark of *Remijia purdicana*. The identification of quinidine has engaged the attention of S. Vreven, who shows that this alkaloid may readily be distinguished from other cinchona bases by the microscopic characters of the crystalline precipitate obtained from its solutions by means of Marmé's reagent. New colour reactions of eserine, veratrine, and the various opium alkaloids, are described by A. J. F. da Silva, G. Laves, and G. Bruylants respectively. G. Sandor has studied the action of potassium permanganate upon solutions of the sulphates of strychnine and brucine, and finds that, under suitable conditions, the destruction of the latter alka-

loid is so complete as to render the reaction available for the entire elimination of this base from strychnine in mixtures of the two. The reduction product obtained by the action of metallic sodium on a boiling alcoholic solution of strychnine is shown by H. Dreser to consist of strychnine hydride, which greatly resembles morphine in its physiological action, and differs in this respect essentially from strychnine. In a recent paper on the aconite bases, W. R. Dunstan and J. T. Cash direct attention to the observation that the extraordinary toxic power of aconitine is mainly dependent on the presence of the acetyl radical in the molecule, whilst the specific action of benzaconine depends on the existence in its molecule of the benzoyl radical. The comparative inertness of aconine is attributed to the absence of the acetyl as well as of the benzoyl group. The recent literature of the alkaloids of hyoscyamus and scopolia is briefly reviewed by L. Merck, with special reference to the discussion carried on during the last few years by E. Schmidt and O. Hesse with regard to hyoscyne and scopalamine. A. Petit and M. Polonovski confirm their previous supposition as to the isomerism of pilocarpine and pilocarpidine, and have succeeded in converting the former into the latter by heating with a solution of sodium hydrate. As this change takes place without any formation of methyl alcohol by the elimination of a methyl group, it is inferred that pilocarpine cannot have the constitution suggested for it by Hardy and Calmels. The isomerism of pilocarpine and pilocarpidine is disputed by C. E. Merck, who arrives at the conclusion that these bases are entirely different in composition. He believes that the discrepancies in the results of various investigators are attributable to the circumstance that the name pilocarpidine has been used for different substances, instead of being confined to the base first described by Harnack as having a composition represented by the formula $C_{10}H_{14}N_2O_2$. The pilocarpidine referred to by Petit and Polonovski is regarded by him as pilocarpine in a more or less altered condition. A research on corydaline, by W. H. Martindale, reveals the fact that the artificial base obtained from dehydrocorydaline by assumption of four atoms of hydrogen, agrees with natural corydaline in composition, melting point, and the properties of most of its salts, but that it is completely inactive towards a ray of polarised light. The alkaloids of *Lycoris radiata*, lupin seeds, yohimbo bark, the nuts of *Pentaclethra macrophylla*, and the tubers of *Dioscorea hirsuta* have also met with notices in this volume.

Additional information respecting the properties of strophanthin

and strophanthidin is furnished by F. Feist, who also gives a description of several hitherto undescribed hydrolytic products obtained from these substances. Oxycannabin, a crystalline product obtained by Bolas and Francis from extract of Indian hemp by oxidation with nitric acid, has been further examined by W. R. Dunstan and T. A. Henry, and is shown by them to have a composition agreeing with the formula $C_{10}H_{10}NO_4$, and to be probably derived from cannabinol. Two new oxysantonins, differing from but isomeric with oxysantonin prepared from *Artemisia maritima*, have been obtained by K. Jaffé from santogenin.

Attention was directed some time ago by E. Schunck and L. Marchlewski to the close relationship existing between hæmatoporphyrin and phylloporphyrin, a substance obtained from chlorophyll. A similar conclusion is now arrived at by M. Nencki with regard to hæmin and phyllotaonin. It may therefore be inferred that the basis of blood pigment and leaf pigment is the same, and that another link is thus established in the chain of evidence respecting the essential unity of animal and vegetable life. Two new bile pigments, a yellow and a green one, are reported upon by A. Dastre and N. Floresco, and these, as well as biliverdin, are shown to be derived from bilirubin by oxidation and hydration. A new and very delicate reaction of bile pigments, which is recommended for the detection of these colouring matters in urine, is described by A. Gluzinski. It depends upon the production of an emerald-green coloration on boiling the liquid to be tested with a few drops of formaldehyde.

Some of the recent contributions to the literature of vegetable enzymes call for a brief notice in this chapter. A new hydrolytic ferment has been obtained by J. Effront from the seeds of *Ceratonia siliqua*, in which it is developed during germination. It is found to act energetically on caroubin, liquefying gelatinous solutions of that carbohydrate. An enzyme isolated by A. Schneegans from the bark of *Betula lenta* is shown to possess the power of effecting the hydrolysis of gaultherin, the products of the action being a carbohydrate and methyl salicylate. The presence of a soluble oxidising ferment in grape juice and wine is confirmed both by G. Tolomei and by A. Bouffard and L. Semichon. In addition to its action on the colouring matter, this substance seems to play a part in the development of the bouquet during the maturing of wine. Some interesting light has recently been thrown on the nature and action of oxidising ferments (oxydases) by the observation that most, if not all, of these bodies contain traces of

manganese, and that the degree of their activity in promoting atmospheric oxidation varies with the proportion of this metal occurring in them. Before quitting the subject of vegetable enzymes, we may mention that a true proteolytic ferment, capable of effecting the solution of coagulated albumin, has been obtained by M. Hahn from yeast extract, and that an enzyme possessing similar properties has been extracted by S. H. Vines from the pitchers of *Nepenthes*.

The influence of alcohol on the digestive action of pepsin is discussed by C. Symes and also by R. H. Chittenden, L. B. Mendel and H. C. Jackson. The results of their experiments show that although alcoholic liquids retard the activity of pepsin, this retardation does not occur in the stomach, owing to the rapid diffusion of the alcohol. It seems to be counterbalanced, moreover, by an increased secretion of gastric juice. Hence an alcoholic liquid, such as wine, cannot be regarded as unsuitable for preparing a solution of pepsin for medicinal use. The results of an investigation by R. H. Chittenden and W. J. Gies, on the influence of borax and boric acid on nutrition, indicate that, while moderate doses of these substances do not exert any effect on the nutritional changes of the body, large doses (5 to 10 grammes daily) retard the assimilation of proteid and fatty food. Neither of these chemicals seems to be capable of arresting putrefactive changes in the intestine. The effect of fresh thyroid or of iodothyryn (thyroidin) on metabolism has been studied by F. Voit, and is shown to consist in an increase in the quantity of urine and the elimination of nitrogen, a deficit in nitrogenous equilibrium, a loss of fat and of general body weight, and an increase in the excretion of carbonic anhydride. While referring to thyroid, we must not omit to call attention to a new preparation of this gland introduced by E. C. C. Stanford under the name of "thyroglandin," which contains both iodothyryn and iodoglobulin, and may fairly be claimed to represent all the active constituents of the gland.

The results of experiments carried out by M. Arloing, respecting the physiological action of human perspiration, seem to demonstrate the presence in this secretion of a toxic constituent, the exact nature of which, however, has not yet been ascertained. This observation appears interesting in view of the fact that rheumatism and other troubles arising from chills are very generally regarded as due to checked perspiration. The occurrence of uric acid in the saliva of patients suffering from uric acid diathesis is pointed out by M. Boucheron. Processes for the estimation of uric

acid in urine are suggested by E. H. Bartley, O. Folin, E. Friend, and F. W. Tunnicliffe and O. Rosenheim, while new tests for the detection of albumin, indican and santouin in urine are described by E. Riegler, A. Loubiou, and L. Daclin respectively.

A certain amount of doubt, which has been occasionally entertained with regard to the value of so-called "diabetic foods" met with in commerce, appears to be justified by the results of an examination of five samples of "gluten flour" by V. G. L. Fielden. Four of these proved to contain from $7\frac{1}{2}$ to 16.7 per cent. of starch and sugar, while in one the proportion of these constituents amounted to nearly 69, and the gluten to only 8.5 per cent. Among recent contributions to food analysis, which have found a place in this volume, may be mentioned the processes for the estimation of casein and of boric acid in milk, the detection of sodium bicarbonate and of annatto in the same liquid, the estimation of sugar in chocolate, the determination of farinaceous admixtures in sausages, and tests for the purity of lard.

The more general application of Kraut's reagent (solution of bismuth potassium iodide) is strongly recommended by E. Jalms for the isolation of alkaloids and other organic bases, such as choline, betaine, etc. It is stated by him to be greatly superior in delicacy to Dragendorff's reagent. A report by A. Hilger and K. Jansen deals with the merits of Küster's method for the separation and detection of vegetable alkaloids and similar active principles in forensic investigations. The action of sulphuric acid on strychnine in the separation of this alkaloid from organic matter has been investigated by E. H. S. Bailey and W. Lange, who find that this mode of purification always involves an appreciable loss of alkaloid, and therefore decreases the delicacy of the reaction by which the final recognition of strychnine is effected. A case of poisoning by atropine is reported upon by P. Soltsien, in which the urine alone gave indications of a mydriatic alkaloid, while the search for it in the stomach, bowels, kidneys, liver and spleen proved unsuccessful. A new method, suggested by A. Villiers, for the destruction of organic matter in forensic analyses, consists in the gradual addition of nitric acid to the substance under examination, in the presence of hydrochloric acid and a small quantity of a salt of manganese.

The separation of chlorine from bromine is effected by H. Baubigny and P. Rivals by a process based on the fact that, whilst aqueous solutions of alkaline bromides or chlorides are not acted upon by potassium permanganate under ordinary conditions, the

decomposition of bromides, but not that of chlorides, can be readily accomplished by means of this reagent in the presence of a sufficient quantity of copper. H. A. D. Jowett describes a method for the assay of commercial hypophosphites, in which, after removing impurities by lead acetate and the excess of lead by sulphuretted hydrogen, the hypophosphite contained in the filtrate is completely oxidised to phosphate, which is then estimated either gravimetrically or by titration. The same chemist advocates the fixing of definite standards of strength and the revision of official tests for the purity of these preparations. The determination of alkalinity or acidity in dark-coloured liquids is accomplished by F. Jean by distilling alkaline liquids with an excess of ammonium sulphate, and acid liquids with a definite volume of normal alkali together with an excess of ammonium sulphate, and estimating the liberated ammonia in the distillates by titration. Solution of calcium sulphate is recommended by A. Leys as a trustworthy reagent for the detection of normal alkali carbonates in bicarbonates, and also for the detection of the former in the presence of a large quantity of borax. The comparative insolubility of sodium dihydroxytartrate, and the readiness with which this salt can be completely oxidised by means of potassium permanganate at the ordinary temperature, form the basis of a very convenient method for the volumetric estimation of sodium. For the gravimetric determination of this metal in presence of potassium, F. F. Beilstein and O. von Blaesé avail themselves of potassium antimoniate to effect the precipitation of the sodium. A modified process for the estimation of potassium as platinochloride is suggested by H. N. Warren; and new methods for the separation of arsenic and antimony are described by E. Donath, S. G. Rawson, and by O. Piloty and A. Stock. The violet coloration produced by lead peroxide in a nitric acid solution of manganese salts is turned to account by M. Lemaire for the rapid detection and determination of small quantities of this metal (manganese) in plant ashes. Calcium carbide is proposed by P. Yvon as an excellent means for the detection of water in alcohol, and likewise for its removal in the preparation of absolute alcohol. For the detection of water in ether, J. Grier suggests the use of carbon bisulphide, which indicates the presence of moisture by the turbidity of the mixture. Finally we may mention that a new method for the assay of spirit of nitrous ether and of amyl nitrite is described by C. E. Smith.

In a paper on rhubarb and its adulterants, L. E. Sayre deals with the structural differences between official rhubarb and the

roots of *Rheum rhaponticum* and *Rumex hymenosepalus*. He finds that, though it is easy to distinguish sections of the official root from those of *Rheum rhaponticum*, there is no trustworthy feature by which an adulteration with the latter can be recognised in the powdered drug. The powdered root of *Rumex hymenosepalus*, however, may be readily distinguished from rhubarb by the characteristic form of its starch grains. Various reactions for the detection of turmeric in powdered rhubarb are described by A. Jaworowsky. Attempts made by R. H. Denniston to establish structural and other differences between the powdered rhizomes of *Veratrum album* and *V. viride*, have failed to give the desired result. A new false ipecacuanha is reported upon by M. G. Dethan, who has identified it as the root of *Polygala violacea*, and shows how it may be distinguished from true ipecacuanha, as well as from the roots of *Richardsonia brasiliensis* and *Psychotria emetica*. J. Chauliagnet, A. Hébert and F. Heim have chemically investigated the roots of *Arum maculatum* and *A. italicum*, and have isolated from them a glucoside and a liquid volatile alkaloid, both of which are stated to possess toxic properties. The botanical differences between *Asarum canadense* and *A. reflexum* form the subject of a report by H. Kraemer. E. M. Holmes gives a description of a cultivated specimen of *Alkanna tinctoria*, the chief source of the alkanet root of commerce. A paper on *Aralia nudicaulis*, by W. C. Alpers and B. L. Murray, deals with the botany, microscopy and chemistry of this plant, as well as with the pharmaceutical preparations of its rhizome. An account given by W. von Schulz, of an examination of the root of *Saponaria rubra*, is mainly confined to the physiological and chemical properties of its active principle, saporubrin, which is a poisonous substance belonging to the sapotoxins. The root of *Spigelia anthelmintica* has yielded to Boorsmaa a toxic alkaloid exerting a paralysing action on the nerve centres. The root of *Baptisia tinctoria* is shown by K. Gorter to contain two distinct glucosides, baptisin and baptin, besides the alkaloid baptitoxine, which has been previously proved to be identical with cytosine. H. Boehm supplies some further particulars respecting the five principles isolated by him from the rhizome of *Aspidium filix mas*. The constituents of Indian podophyllum (*Podophyllum emodi*) are found by W. R. Dunstan and T. A. Henry to be identical with those of the American drug (*Podophyllum peltatum*). Podophyllotoxin, the most important of these constituents, appears to occur in notably larger proportion in the Indian than in the American rhizome,

The chemistry of cascarilla has been materially advanced by the results of a research recently carried out by W. A. H. Naylor. Any uncertainty hitherto remaining as to the existence of the alkaloid cascarilline, has now been removed by the isolation of this base in a pure state, and the preparation of its platinum salt. The alkaloid allied to choline, which was mentioned in 1885 by Boehm as a constituent of this bark, is identified in this research as betaine. The bark of *Periploca græca* has been re-investigated by E. Lehmann, who supplies further particulars respecting the characters of its bitter active glucoside, which he has previously shown to be a cardiac poison similar in its action to digitalin, strophanthin and ouabain. J. A. Battandier and T. Malosse have extracted from the bark and young shoots of *Retama sphaerocarpa* a new alkaloid, which they regard as a hydroxysparteine. The conflicting statements hitherto published with regard to *Cactus grandiflorus* (*Cereus grandiflorus*) are traced by E. M. Holmes to the frequent occurrence of a spurious drug in the market. His examination of commercial specimens has revealed the fact that the drug sold under this name represents not merely the stem of *Cereus grandiflorus*, but also the flowers of *Opuntia decumana* and the stem of a *Phyllocactus*.

In a report on digitalis and its active principles, C. C. Keller arrives at the conclusion that foxglove leaves, as well as the seeds, contain the principles digitoxin, digitonin and digitalin; that digitalein is probably a mixture of digitonin with small proportions of digitoxin and digitalin; further, that digitonin is of little therapeutic importance, and that digitoxin is the most potent constituent of the drug. The latter is found by him to occur in the leaves in quantities varying from 0.26 to 0.62 per cent., and in much smaller proportion in the seeds. In view of the great variation in potency between different samples of the leaves, he recommends the adoption of a process for determining the therapeutic value of the drug and its galenical preparations on the basis of the amount of digitoxin contained in them. The process suggested by him for this purpose is also discussed by G. Fromme. A modification of Keller's general assay process is proposed by W. A. Puckner for the estimation of the total alkaloids in belladonna. Matico leaves, as met with in commerce, are shown by G. Dethan and R. Bertaut to contain two varieties of *Piper angustifolium*, exhibiting differences in the shape of the leaves. Jaborandi has engaged the attention of H. Geiger, who confirms the main conclusions arrived at by E. M. Holmes with regard to the botanical sources of the

various kinds of this drug occurring in the market. In a paper on the structure of eucalyptus leaves, A. Schneider deals with the comparative anatomy of two distinct leaf forms of *Eucalyptus globulus*.

E. M. Holmes calls attention to a hitherto undescribed species of *Strophanthus*, *S. Nicholsoni*, specimens of which were received by him from Central Africa through T. G. Nicholson. H. Thoms gives an account of a chemical investigation of the seeds of *Strophanthus hispidus*, in which it is shown that, in addition to the glucoside strophanthin, these seeds contain two basic constituents which have been identified as choline and trigonelline. The presence of these bases has also been established in the seeds of *Strophanthus kombé*. A new crystalline constituent, possessing a remarkable degree of pungency, has been extracted by M. Norbitz from capsicum fruit, and is believed by him to be the real pungent principle of the drug. It is neither an alkaloid nor a glucoside, and has a composition corresponding to the formula $C_{35}H_{54}N_3O_4$. Glutamine and ricidin, the latter of which is a new nitrogenous principle of the formula $C_{12}H_{13}N_3O_3$, have been isolated by E. Schulze from the etiolated germinating shoots of *Ricinus communis*. The structure of genuine cardamoms, the produce of *Elettaria cardamomum*, has been studied by B. Niederstadt, side by side with that of other kinds derived from species of *Anomum*. His examination, however, has not revealed histological differences sufficiently marked to be depended upon for the differentiation of the powdered drugs. According to Shaer, the presence of manganese in the ash of genuine cardamoms, and its absence in the ash of other kinds, may serve as a useful means of distinction. The frequent occurrence of the fruits of *Setaria glauca* and of *Echinochloa crus galli* as adulterants in aniseed are mentioned by M. Volkart. A test, suggested by A. Tschirch, for distinguishing genuine star-anise from the fruit of *Illicium religiosum*, is based upon the observation that an alcoholic tincture of the genuine drug forms a turbid mixture with water, while a tincture of the spurious fruit yields a clear mixture. J. C. Umney describes dill fruits of English, Indian, German, and Japanese origin, and gives analytical data respecting their oils. The English or German fruits, as well as their oils, are regarded by him as preferable to others for pharmaceutical purposes.

The pharmacy of cantharides forms the subject of a valuable report by H. G. Greenish and H. Wilson. These authors point out that, in the case of this drug, the active principle is present in so

small a proportion, that the assay of most of the official preparations, and their standardization on the basis of such an assay, appear impracticable. It is therefore proposed that preparations made from pure cantharidin should replace those made direct from the drug; and with this object in view definite formulæ are suggested, such as would yield products of practically the same strength as those of the present Pharmacopœia.

Pale catechu has been further investigated both by A. G. Perkin and K. Dieterich, the former of whom shows that this drug, as well as black catechu, contains a yellow colouring-matter identical with quercetin, while the latter deals with two new constituents, which he describes under the names of *gambirfluorescein* and *gambir-catechu-red* respectively. This author (Dieterich) also gives an account of a characteristic reaction of gambir. A true manna has been observed by R. T. Baker and H. G. Smith on a "blue grass," *Andropogon annulatus*; and a saccharine exudation from *Larix occidentalis* is referred to by H. Trimble. New processes for the assay of aloes and of opium are introduced by G. L. Schaefer and by C. Montemartini and D. Trasciatti.

The great variability of copaiba in its composition and characters is again illustrated by a number of analyses published by L. F. Kebler, who also supplies further evidence of the uselessness of the magnesia test as a criterion of purity, and of the gelatinisation test for the detection of admixtures of gurjuu oil. Tests for the purity of Peruvian balsam are described by Gehe & Co., K. Dieterich and E. Hirschsohn. J. Moeller discusses the origin of storax, and shows that this balsam is not a product of the bark, but a pathological secretion of the young wood. The purification of liquid storax is dealt with by H. Krüer. Under the name of liquid benzoin, a preparation consisting of an ethereal extract of benzoin mixed with a definite proportion of castor oil is introduced by R. M. Shoemaker, and is stated to be better suited than ordinary benzoin for the preparation of benzoated lard, and to ensure greater uniformity in the product. A kind of myrrh, exported from Somaliland and called "bisabol" by the Arabs, is reported upon by M. Tucholka.

Oil of theobroma, when melted and cast in moulds, is shown by E. White to undergo remarkable variations in its specific gravity, which is found to increase progressively from about '950 to '995, reaching its highest value after several days. The bearing of these variations on the use of this oil for suppositories is pointed out in the same paper. Castor oil and its active constituent are discussed

from a chemical point of view by H. Meyer. The oil met with in commerce under the name of "morrhual" has been examined by C. Gundlich, who finds that a very similar product can be obtained by neutralising cod liver oil, then treating it with alcohol of 80 per cent., and evaporating the alcoholic solution. Numerous essential oils reported upon during the past year have met with notices in this volume, but we regret that want of space prevents us from referring to these individually in this chapter.

A considerable number of drugs, both old and new, have been investigated with regard to their therapeutic action. The value of hydrastis as an expectorant in bronchitis is very favourably commented upon by M. Saenger, who considers it to be superior in its action to most other remedies of this class. The leaves of *Eupatorium triplinerve* are recommended as a bitter aromatic tonic and stomachic. The flowering herb of *Daviesia latifolia*, an Australian plant belonging to the order *Leguminosae*, is stated by J. Bosisto to enjoy a local reputation as a remedy for hydatids, low fevers, etc. It appears to contain a glucoside which is being investigated. Experiments with celandine (*Chelidonium majus*), conducted by Winter and Schmidt, have failed to confirm the alleged value of this plant in the treatment of cancer. A very favourable account is given by W. E. Fothergill of the action of *Senecio jacobae* as a direct emmenagogue in cases of functional amenorrhœa; while *Senecio aureus* is strongly recommended by D. T. Gundrum as an internal hemostatic in hæmoptysis, hæmaturia, etc. Attention is directed to the curare-like action of *Echium vulgare*, a toxic plant belonging to the *Boraginaceae*. In connection with this subject, it is interesting to note that *Cynoglossum officinale*, another member of the same order, possesses similar physiological properties. *Pelargonium reniforme* is spoken of as a remedy for dysentery, *Arctopus echinatus* as a specific for gonorrhœa, *Asclepias curassavica* as an insecticide, several species of *Calophyllum* as remedies for tapeworm and rheumatism, Iceland moss as an anti-emetic, and powdered benzoin as an excellent application to the pharynx and nostrils in whooping-cough. The fixed oil from the seeds of *Omphalea megacarpa* (nat. order, *Euphorbiaceae*) is reported to be a prompt and efficient purgative, free from the objection of causing pain or other unpleasant symptoms. Oil of capéput has proved very serviceable in croupous pneumonia, cinnamic acid and ichthyol in tuberculosis, sulphonal and likewise thallium acetate for relieving the night-sweats of phthisical patients, amyl nitrite and also convallamarin in chloroform narcosis, creosote in constipa-

tion, thyroid extract as a galactagogue, urea in gout, sodium sulphite in bronchitis, sodium sulphate and sodium salicylate in hæmoptysis, copper arsenite in gastro-intestinal catarrh, and manganese salts in dysmenorrhœa.

Numerous additions have again been made to the list of so-called chemical remedies, many of which have met with notices in Part III. (Notes and Formulæ) of this volume.

Some brief allusions to the recent literature of antidotes may not be out of place in this chapter. C. Glücksmann has investigated the comparative merits of the chief antidotes to arsenious acid now in use, and arrives at the conclusion that magnesium hydrate prepared by precipitation is the most efficient and trustworthy. The value of oil of turpentine as an antidote to phosphorus is confirmed by M. Velter; while further evidence is offered by L. E. Sayre respecting the efficacy of potassium permanganate as an antidote to morphine. E. von Cyon discusses the antagonistic action of iodothylin and atropine, and likewise the antagonism between sodium iodide and muscarine. Hypodermic injections of strychnine have been successfully employed by Macpherson for counteracting the effects of African arrow poison prepared from species of *Acokanthera*; and it is not improbable that the same remedy may also prove an efficient antidote for the arrow poisons obtained from *Strophanthus*. Considerable interest attaches to recent observations by C. Phisalix, that cholesterol and bile salts, and likewise tyrosin, exert an immunising effect on the venom of vipers, and that the action of these substances is purely that of a vaccine, and not an antitoxic one.

E. H. Squibb confirms the value of acetic acid as a menstruum for the exhaustion of crude drugs containing active principles. In his opinion, this acid may with advantage replace alcohol in the preparation of fluid and solid extracts from almost all classes of drugs, including those containing oleo-resins. In some instances, however, proof spirit appears to be at least equal to acetic acid for the extraction of active principles, and the results obtained by R. C. Cowley and T. P. Catford show colchicum corm and seeds to represent cases of this kind. Acetone is recommended by E. T. Hahn as a solvent for the extraction of the resins of jalap, podophyllum and scammony, and is stated to give larger yields than alcohol. The same menstruum has given T. H. W. Idris very good results in the extraction of the whole of the aromatic and pungent principles from ginger. E. H. Farr and R. Wright call attention to the fact that the so-called green extracts pre-

pared from plant juices are usually much overloaded with inert matter, and are deficient in active principles. In order to remedy these defects, they demonstrate the superiority of extracts prepared from dried drugs of good quality by alcoholic extraction and subsequent evaporation of the resulting tinctures at a low temperature. W. A. H. Naylor and J. J. Bryant deal with a process for the assay of green extracts, and advocate the fixing for these preparations of a definite standard of alkaloidal strength. J. J. Bryant also shows that the new official process for the preparation of liquid extract of belladonna involves a loss of alkaloids, which may be avoided by certain modifications. The same process is also discussed and a modification proposed by H. Wilson. In a report on fluid extract of liquorice, P. Boa points out that percolation with water in the preparation of this extract is a satisfactory process, especially if a little ammonia be added to the percolate so as to prevent loss of sweet principle arising from acidity during the process. An expeditious polarimetric method for the assay of the official extract and tincture of *strophanthus* is described by E. Dowzard. The preparation and examination of suppositories is ably discussed by E. White and J. O. Braithwaite, and suggestions are made by various authors for improvements in the preparation of emulsions, syrups, several official ointments, etc.

While alluding to subjects of practical interest, we must not forget to mention a valuable report by J. Moss, on kieselguhr and other infusorial earths, which conveys much useful information respecting the nature and properties of these substances, and their various practical applications.

Finally we desire to invite the reader's attention to a series of important papers on the new Pharmacopœia by F. C. J. Bird, H. W. Gadd, P. MacEwan, P. Kelly, A. L. Doran and G. C. Druce, all of which were read and discussed at the Belfast meeting of the British Pharmaceutical Conference.

CHEMISTRY.

YEAR-BOOK OF PHARMACY.

PART I.

CHEMISTRY.

Liquefaction of Hydrogen and Helium. J. Dewar. (From a paper read before the Royal Society, May 12th, 1898.) The author has succeeded in effecting the liquefaction of hydrogen and of helium. This was accomplished by cooling hydrogen down to -205°C ., allowing it to escape continuously under a pressure of 180 atmospheres from the nozzle of a coil of pipe at the rate of 10 to 15 cubic feet per minute, and conducting it into a vacuum vessel of special construction, surrounded by a space kept below -200°C . The yield of liquid hydrogen was about 1 per cent. of the gas operated upon. The liquefaction of helium was accomplished by immersing a tube containing the gas in the liquid hydrogen.

Liquid hydrogen is described as a colourless liquid, showing a meniscus as distinct as that of water; its refractive index and dispersion are high, and it shows no absorption spectra. Air contained in a tube, when immersed in the liquid, was immediately solidified. A more complete description of the two liquefied gases is reserved for a further report.

The Boiling Point and Density of Liquid Hydrogen. J. Dewar. (*Proc. Chem. Soc.*, 1898, No. 196.) The boiling point of liquid hydrogen at atmospheric pressure was determined by a platinum resistance thermometer. This was constructed of pure metal, and had a resistance of 5.3 ohms at 0°C ., which fell to about 0.1 ohm when the thermometer was immersed in liquid hydrogen. On reduction of this resistance to normal air temperatures, the boiling

point was found to be -238.2° and -238.9° respectively by two methods, and to be -237° by a Dickson formula calculated for this thermometer (*Phil. Mag.*, 1898, 45, 525). The boiling point of the liquid is, therefore, about -238° C., and is thus about 5° higher than that obtained by Olszewski by the adiabatic expansion of the compressed gas, and about 8° higher than that deduced by Wroblewski from van der Waals' equation.

The approximate density of liquid hydrogen at its boiling point was determined by measuring the volume of the gas obtained by evaporating 10 c.c., and is slightly less than 0.07, or about one-sixth that of liquid marsh gas, which has a density of 0.41 and is the lightest liquid at its boiling point hitherto known.

Properties of Liquid Fluorine. H. Moissan and J. Dewar. (*Comptes Rendus*, cxxv. 505.) The authors have followed up their success in liquefying fluorine (*Year-Book of Pharmacy*, 1897, 27) by a study of the properties of the liquefied element. Liquid fluorine boils at -187° C. Its density, determined by floating particles (cooled to -200° C.) of solids of known specific gravity in the liquid, was found to be 1.14. It exhibits no absorption bands, and is not magnetic. At -210° C. it is without action on oxygen, water, and mercury, but combines with explosive violence with hydrogen and with oil of turpentine. At less low temperatures it acts very energetically on combustible substances generally.

Gaseous fluorine readily liquefies at the boiling point of air. The authors have not yet succeeded in obtaining this element in a solid state.

Atomic Weights of Nitrogen and Arsenic. J. G. Hibbs. (*Journ. Amer. Chem. Soc.*, xviii. 1044-1050.) Series of re-determinations of the atomic weights of these two elements show the following mean results:—

$$\text{N} = 14.0003.$$

$$\text{As} = 74.9158.$$

Atomic Weight of Boron. F. P. Armitage. (*Proc. Chem. Soc.*, 1898, No. 188.) In a series of determinations, the mean atomic weight of this element was found to be 10.959, a number differing by 0.006 from that recently obtained by Ramsay and Aston.

Atomic Weight of Nickel. T. W. Richards and A. S. Cushman. (*Zeitschr. anorg. Chem.*, xvi. 167-183.) Twenty-one determinations were made, the mean result of which show the atomic weight of nickel to be 58.25 (O = 15.88).

Atomic Weight of Zinc. H. N. Morse and H. B. Arbuckle. (*Amer. Chem. Journ.*, xx. 195-202.) The results of eight determinations, ranging from 65.437 to 65.489, give the average number 65.457 as the corrected value for the atomic weight of zinc, that of oxygen being taken as 16.

Preparation of Sulphuretted Hydrogen free from Arsenic. J. R. Michler. (*Chem. Zeitung*, xxi. 659.) The author prepares sulphuretted hydrogen for laboratory purposes by the action of pure hydrochloric acid on a solution of calcium sulphide. The gas thus obtained requires no further purification, and is absolutely free from arsenic.

Oxidising Power of Animal Charcoal. M. Dupuy. (*Pharm. Journ.*, from *Bull. de la Soc. de Pharm. de Bordeaux*, xxxvii. 171.) The author demonstrates the oxidising power of animal charcoal by the addition of a few grains of that substance to a few c.c. of fresh tincture of guaiacum. An immediate intense blue coloration is produced in the cold. Wood charcoal does not give this reaction. It is regarded as probable that the beneficial effect of animal charcoal on ulcerations and granular wounds may be due to its oxidising properties.

Oxidation of Phosphorus Dissolved in Fatty Oils. M. Schweisinger. (*Pharm. Centralt.*, 1897, 711.) When a bottle partially filled with phosphorated oil is opened, white fumes are given off which disappear again on closing the bottle and shaking. These fumes consist of oxidation products of phosphorus, chiefly phosphoric acid, which, on shaking, dissolve in the oil. This oxidation is not inconsiderable; an oil which originally contained 0.5 per cent. of phosphorus, was three months afterwards found to contain 0.69 per cent. of phosphoric acid, thus showing a loss of 0.22 per cent. of phosphorus by oxidation. Phosphorated oil ought therefore to be either freshly prepared, or, if it be kept at all, it should be stored in small bottles filled right up to the stopper.

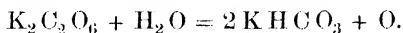
Phosphorus Iodides. M. Besson. (*Comptes Rendus*, cxxiv. 1347.) Pure phosphorus triiodide, PI_3 , is obtained by the action of hydriodic acid on a solution of phosphorus trichloride in carbon tetrachloride. It forms dark red crystals, which fuse at 61°C ., and are decomposed by water. Its solution in carbon bisulphide is reduced by finely divided silver yielding the diiodide, P_2I_4 , which fuses at 110°C . with partial decomposition. When heated to about the same temperature under reduced pressure, this compound splits up into phosphorus triiodide and amorphous phosphorus. The diiodide can also be obtained from the triiodide by using

mercury instead of silver as the reducing agent; but with an excess of mercury the reduction proceeds further, the final products of the reaction being mercurous iodide and a double iodide of mercury and phosphorus. The author also mentions an unstable compound of the formula P_3I_4 , and believes this to be the intermediate product in the conversion of crystalline into amorphous phosphorus, which takes place on treating the former with a carbon bisulphide solution of iodine. He supposes that in this process P_3I_4 is first formed, which is then decomposed into amorphous phosphorus and P_2I_4 , and that the latter is re-converted into P_3I_4 by the action of a fresh portion of crystalline phosphorus, the reaction then repeating itself in the same manner.

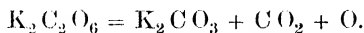
Hypiodous Acid and Hypiodites. R. L. Taylor. (*Chem. News*, lxxvi. 17-20, 27-29; *Journ. Chem. Soc.*, 1898, ii. 21.) The author confirms Schönbein's observation that when an aqueous solution of iodine is decolorized by the addition of ammonia, the resulting liquid bleaches indigo, and gives a blue colour with starch. He further shows that solutions of potash, soda, lime, and barium hydrate react with iodine in the same manner as ammonia, and that the bleaching strength of such solutions corresponds with the amount of iodine present. These solutions decompose in a few hours at ordinary temperatures, and in a few minutes when boiled, with the production of iodide and iodate. Acids decompose them with the liberation first of hydriodic and hypiodous or iodic acids, which at once react so that free iodine and water are obtained. With silver nitrate, the solutions yield a dark buff precipitate of the hypiodite mixed with hydrate and iodide; with a cobalt solution, a black precipitate on standing; with a manganous salt, a dark brown precipitate immediately; with lead salts, a precipitate containing brown lead peroxide, and with hydrogen peroxide, an immediate and copious evolution of oxygen. Solutions obtained by shaking mercuric oxide with an aqueous solution of iodine have a slight bleaching action (due to hypiodous acid), which at once greatly increases on the addition of a drop of alkali, the action then being as well marked as in the hypiodite solutions just referred to. The free acid decomposes into hydriodic and iodic acids, which re-act and yield free iodine and water; it does not turn starch blue until after exposure to the air.

Percarbonates: A New Class of Oxidising Substances. M. Constan and A. von Haussen. (*Chem. News*, lxxvi. 170, 171.) On electrolyzing a saturated solution of potassium carbonate, and gradually lowering the temperature, the disengagement of oxygen

at the anode ceases altogether at -10° C. But instead of the crystalline bicarbonate being formed, as is the case when an alkali carbonate is subjected to electrolytic action under ordinary conditions, the result is a bluish amorphous powder, having the formula $K_2C_2O_6$; this is potassium percarbonate. Its formation does not take place in weak solutions. Owing to its hygroscopic nature, the powder requires to be quickly thrown on a filter, and to be dried over phosphoric anhydride. It decomposes water at the ordinary temperature:—



When gently heated, it decomposes according to the following equation:—



In the presence of oxidisable matters it acts as an oxidising agent. But it can also act as a reducing agent:—



From these reactions the authors conclude that this compound is a neutral carbonate of potassium peroxide. Like the higher oxides of the alkalies and of the alkaline earths, it produces hydrogen peroxide when brought in contact with acids.

Some Chemical Properties of Concentrated Solution of Potassium Carbonate. W. C. Reynolds. (*Proc. Chem. Soc.*, 1898, No. 190.)

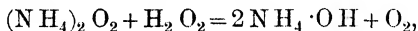
When the salts of certain other metals are added to a concentrated solution of potassium carbonate, double salts are formed which are sometimes, as in the case of iron, copper, nickel, and cobalt, soluble in the solution, instead of the normal or basic carbonates which are formed when a dilute solution is employed.

These double salts and their solutions are decomposed by pure water. To obtain them, the chloride, nitrate, or preferably the acetate, is added to a concentrated solution of potassium carbonate (sp. gr. 1.55), and the liquid left to crystallise. The author has isolated the following double salts in well-defined crystalline form:— $CuK_2(CO_3)_2$, $CuK_2(CO_3)_2 \cdot H_2O$, $CuK_2(CO_3)_2 \cdot 4H_2O$, $MnK_2(CO_3)_2 \cdot 4H_2O$, $FeK_2(CO_3)_2 \cdot 4H_2O$, $CaK_2(CO_3)_2$, $Bi_2O \cdot K_4(CO_3)_4 \cdot H_2O$, $CoK_2(CO_3)_2 \cdot 4H_2O$, $NiK_2(CO_3)_2 \cdot 4H_2O$, $MgK_2(CO_3)_2 \cdot 4H_2O$, $AgKC_2O_3$. The last four salts have been previously obtained by other chemists.

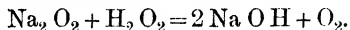
Potassium Sulphantimonites. M. Pouget. (*Comptes Rendus*, cxxiv. 1445.) Normal potassium sulphantimonite, K_3SbS_3 , forms small, white, deliquescent crystals which rapidly decompose on

exposure to air. It is obtained by dissolving one molecular weight of antimony sulphide in a saturated solution of three molecular weights of potassium sulphide, and evaporating and drying the residue in vacuo. By using two instead of three molecular weights of potassium sulphide in a similar manner, the metasulphantimonite, K Sb S_2 , is obtained in the form of small red octahedric crystals which stand exposure to air but are decomposed by boiling water. The author also mentions a pyrosulphantimonite, $\text{K}_4 \text{ Sb}_2 \text{ S}_5$, and a compound of the formula $\text{K}_2 \text{ Sb}_4 \text{ S}_7$.

Ammonium Peroxide. P. G. Melikoff and L. Pissarjewsky. (*Ber. der deutsch. chem. Ges.*, xxxi. 446-449.) On cooling a saturated ethereal solution of hydrogen peroxide and ammonia to -40°C ., the sides of the vessel become coated with a granular crystalline mass which, after washing with ether and drying on porous tiles at the same low temperature, has the composition $(\text{NH}_4)_2 \text{O}_2 + \text{H}_2 \text{O}_2$. These crystals are cubical and isotropic and readily undergo decomposition. If this decomposition occurs at or near -40°C ., ammonia and hydrogen peroxide are formed; but if it takes place at the ordinary temperature, the resulting products are ammonium hydrate and oxygen, accompanied by mere traces of ammonium nitrite. The latter decomposition therefore occurs in accordance with the equation—



and is strictly analogous to the well-known reaction between sodium peroxide and hydrogen peroxide, viz.,



Hence it may be assumed that the evolution of oxygen which takes place when ammonia and hydrogen peroxide are brought together in solution, is in reality due to a reaction between ammonium peroxide and peroxide of hydrogen and not to a mere catalytic action of the ammonia as supposed by Traube.

Sodium Iodide. J. C. Umney. (*Pharm. Journ.*, 4th series, v. 317, 318.) It is stated in text books that when this salt is crystallized at 20°C . or upwards, it is obtained in anhydrous cubes, while below that temperature it crystallises in deliquescent hexagonal plates containing two molecules of water. Specimens of the commercial salt are found always to contain variable amounts of water, showing the presence in them of the hydrated salt in various proportions. When prepared in strict accordance with the official directions, the product is likely to be in most cases a

mixture of the anhydrous iodide and the hydrated salt. The author points out that the British Pharmacopœia seems to ignore this point, inasmuch as the characters and tests given therein are not fully responded to by any preparation containing less than 99 per cent. of anhydrous sodium iodide. The U.S. Pharmacopœia allows the presence of up to 5 per cent. of water in this salt, and the requirements of the German Pharmacopœia are practically the same. In the author's opinion, a similar standard should be adopted in the B.P., if its present requirements should prove impracticable.

Preparation of highly phosphorescent Strontium Sulphide. J. R. Mourelo. (*Comptes Rendus*, cxxiv. 1024 and 1237.) The following process is recommended as yielding a product showing a most brilliant greenish-blue phosphorescence after a short exposure to light:—285 grammes of ordinary commercial strontium carbonate, 62 grammes of sublimed sulphur, 4 grammes of crystallised sodium carbonate, 2·5 grammes of sodium chloride, and 0·4 gramme of bismuth subnitrate are intimately mixed together and packed in an earthen crucible, then covered with a layer of powdered starch 2 cm. deep, and heated to bright redness in a coke fire for 5 hours, after which the crucible with its contents is allowed to cool for 10 or 12 hours.

The author confirms Verneuil's statement that strontium sulphide, like the calcium compound, loses its phosphorescent power if finely powdered, but regains it on being mixed with starch and heated to bright redness for 5 hours. The presence of small quantities of alkali compounds and of bismuth seems to be an essential condition to phosphorescence in these sulphides; and in the case of the strontium compound the presence of a small proportion of sulphate also appears to be indispensable.

Basic Magnesium Bromide. M. Tassily. (*Comptes Rendus*, cxxv. 605.) The author has prepared a magnesium oxybromide of the composition $\text{Mg Br}_2 \cdot 3 \text{ Mg O} \cdot 12 \text{ H}_2 \text{ O}$, by saturating a very strong boiling solution of magnesium bromide (containing nearly 50 per cent.) with magnesium hydrate, and setting the solution aside in stoppered flasks to crystallise. Attempts to obtain a corresponding oxyiodide proved unsuccessful.

Action of Iodine on Solutions of Stannous Chloride. S. W. Young and M. Adams. (*Journ. Amer. Chem. Soc.*, 1897, 515-525. From *Journ. Chem. Soc.*) On adding a concentrated solution of 2 molecules of stannous chloride containing hydrochloric acid to 2 molecules of iodine, the latter dissolves, and orange-

coloured crystals separate, which consist principally of stannic iodide; they contain, however, about 1.25 per cent. of chlorine, which is completely removed on recrystallisation from acetic acid or carbon bisulphide. If an excess of stannous chloride is employed, and the mixture heated with just sufficient water to dissolve the crystals that first separate, orange-red needles are obtained, which consist of stannous iodide contaminated by stannous chloride. The change is, however, not represented quantitatively by the equation $2 \text{ Sn Cl}_2 + \text{I}_2 = \text{Sn I}_2 + \text{Sn Cl}_4$; when the proportions are those required by this equation, crystals separate which contain about 5 per cent. of stannous chloride; the latter is present in a still greater proportion when a larger excess of stannous chloride is employed. In such cases, red crystals first separate, but on standing, light-yellow patches of needles are also formed, the composition of which varies; they appear to contain an amount of stannous chloride roughly proportional to the excess of the chloride employed in their preparation, and are probably isomorphous mixtures of stannous iodide and chloride. The amount of the latter varies from 34 to 43 per cent.; and the authors consider that the stannous chloriodide, Sn I Cl , described by Henry, is not a definite compound, but an accidental mixture of stannous chloride and iodide in equivalent proportions.

Preparation of Soluble Ferric Hydrate. W. A. Puckner. (*Amer. Journ. Pharm.*, 1897, 494, 495.) The author offers the following as a simplified process, yielding a product of fairly constant composition:—

Ferrous sulphate, in clear crystals	156 grammes
Sulphuric acid	20 c.c.
Potassium chlorate	12 grammes
Ammonia water	340 c.c.
Citric acid	120 grammes
Sodium phosphate, uneffloresced	200 grammes
Water	A sufficient quantity

Add the sulphuric acid to 240 c.c. of water, contained in a glass or porcelain vessel; to this add the ferrous sulphate, warm gently until all is dissolved, then add the potassium chlorate and continue heating for half an hour, or until a drop of the solution added to potassium ferricyanide solution no longer produces a distinct green or bluish-green colour. Add this solution, slowly and with constant agitation, to the ammonia water contained in a suitable vessel; to this mixture add 4,000 c.c. of hot water, allow to subside, and, after half an hour, decant or siphon off the clear

supernatant liquid. To the residue add 2,000 c.c. of hot water, allow to subside and decant; repeat this washing with six portions of hot water, allowing the last portion to subside for at least six hours or over-night. Decant or siphon off the clear liquid as closely as possible, then add to the remaining magna the citric acid and the sodium phosphate, warm gently until solution is effected, then evaporate on a water-bath at a temperature not exceeding 60°C ., until the solution weighs 500 grammes, and spread it on plates of glass, so that, when dry, the salt may be obtained in scales.

To obtain a solution of which 2 c.c. are equivalent to 1 gramme of soluble ferric phosphate, U.S.P., 1890, evaporate on a water-bath at a temperature not exceeding 60°C . until the solution measures 500 c.c.

Note on Manganic Salts. C. E. Rice. (*Proc. Chem. Soc.*, 1898, No. 190.) The author shows that the decomposition of manganic chloride in solution into manganous chloride and chlorine is reversible, the velocity of the reverse change being very small. He also describes the production and analysis of two double manganic chlorides, $2\text{K Cl} \cdot \text{Mn Cl}_3, \text{H}_2\text{O}$ and $2\text{N H}_4\text{ Cl} \cdot \text{Mn Cl}_3, \text{H}_2\text{O}$, but furnishes no evidence of the existence of a compound of the formula Mn Cl_4 .

Mercurous Iodide. M. François. (*Journ. de Pharm.* [6], vi. 529-533.) The author shows that pure mercurous iodide has a bright yellow colour resembling that of chromate of lead. The greenish colour of the commercial preparation is due to the presence of metallic mercury. The pure salt, quite free from this impurity and also from mercuric iodide, may be obtained by slowly adding, drop by drop, a solution of 50 grammes of potassium iodide in 100 c.c. of water to a solution of 125 grammes of mercurous nitrate in 2 litres of water acidified with 20 c.c. of nitric acid. The mixture is stirred all the time, and then vigorously shaken for about 15 minutes. The precipitate is at first greenish yellow, but soon changes to a pure bright yellow; it is left in contact with the mother liquor for 24 hours in the dark, and is then washed a number of times by decantation, 2 litres of water being used for each washing. Finally it is transferred to a filter and dried at 50°C . Exposure to light should be avoided throughout the process.

Mercuroso-Mercuric Iodide. M. François. (*Journ. de Pharm.* [6], vi. 443.) A salt of the composition Hg_4I_6 was first described by Boullay, and is referred to in most of the chemical

text books. The author now finds that this substance is not a definite compound, but a mere mixture of mercurous and mercuric iodides, which can be separated by treatment with ether. This solvent removes the mercuric iodide, and leaves a bright yellow insoluble residue of mercurous iodide. The author describes several reactions throwing light on the cause of the erroneous conception formed by Boullay respecting the nature of this preparation.

The Solubility of Mercuric Chloride in Ether. H. P. Madsen. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 479.) Attention is called in this paper to the conflicting statements of different Pharmacopœias with regard to the degree of solubility of mercuric chloride in ether. The author finds all these statements to be more or less incorrect. According to his own determinations, 8.8 grammes of a saturated ethereal solution of this salt contain exactly 1 gramme of the latter.

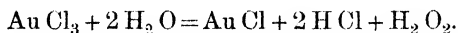
Action of Arseniuretted Hydrogen on Mercuric Chloride. A. Partheil and E. Amort. (*Ber. der deutsch. chem. Ges.*, xxxi. 594, 595.) This action results in the successive formation of $\text{AsH}(\text{Hg Cl})_2$ and $\text{As}(\text{Hg Cl})_3$, the former of which is yellow while the latter is brown. Both are formed in alcoholic as well as in aqueous solutions. The prolonged action of the gas on alcoholic solutions of mercuric chloride finally leads to the formation of a black precipitate of the composition As_2Hg_3 . Attempts to obtain a compound of the formula $\text{AsH}_2 \cdot \text{Hg Cl}$ gave negative results.

Action of Sulphuric Acid on Mercury. J. R. Pitman. (*Journ. Amer. Chem. Soc.*, xx. 100.) Baskerville and Miller have stated that mercury decomposes concentrated sulphuric acid at about 20°C . The author has repeated their experiments, under varying conditions, but has not been able to confirm the statement referred to. His results point to the conclusion that no reaction takes place between the metal and the acid at or near the ordinary temperature.

Decomposition of Auric Chloride in Dilute Solutions. E. Sonstadt. (*Chemical News*, lxxvii. 74.) The author's experiments do not confirm the statement of text-books that auric chloride in solution is decomposed by exposure to light. But the same solution which failed to react on moderate exposure to light gave a precipitate of metallic gold on heating for some hours. In a second experiment a solution of 1 part of auric chloride in 15,000 parts of water, coloured by the addition of a little potassium bichromate, was carefully distilled in such a manner as to entirely exclude

organic matter. This solution behaved on heating exactly in the same way as the previous one, gold being precipitated. In both cases a trace of hydrogen peroxide was detected in the solution after the reaction had taken place. It is supposed that if the reaction took place without heating, a much more distinct indication of hydrogen peroxide would be obtained.

The reaction appears to be entirely analogous to that which the author has shown to take place when a dilute solution of platinic chloride is similarly heated. It might therefore be represented by the equation—



But as aurous chloride splits up, when heated with water, into gold and auric chloride, gold only is precipitated.

The author considers it probable that the indicated reaction may be a general one for the higher chlorides of metals of the platinum group.

Iodide of Lead and Potassium. F. C. H. Brooks. (*Chem. News*, lxxvii. 191.) The author reports upon a double iodide of lead and potassium of the composition $\text{Pb I}_2 \cdot 2 \text{K I}$, which possesses the remarkable property of being decomposed by water, with the formation of lead iodide and potassium iodide. It is prepared by adding to a solution of 1 gramme of lead nitrate in 10 c.c. of water, a saturated solution of potassium iodide until the precipitated lead iodide is just dissolved. On allowing the solution to stand for a few minutes, a copious crystalline white precipitate of the double iodide separates, which is washed with absolute alcohol to remove excess of potassium iodide, and preserved in a stoppered bottle over calcium chloride. The product is sparingly soluble in boiling chloroform, but readily so in strong solution of potassium iodide. A very short exposure to moist air suffices to decompose the salt, the change being indicated by the appearance of a yellow colour, due to the formation of normal lead iodide. When gently heated it also becomes yellow, but resumes its original white colour on cooling. When heated more strongly it is partially decomposed, with evolution of iodine vapours.

The peculiar reaction of this salt with water renders it the most delicate test for the latter. It is capable of detecting the presence of traces of moisture in chloroform and ether which are too small to impart the slightest colour to anhydrous copper sulphate.

Action of Magnesium on Cupric Sulphate Solution. F. Clowes and R. M. Caven. (*Proc. Chem. Soc.*, 1897, No. 184.) The authors have examined the action of magnesium on solutions of

cupric sulphate of different strengths, both at atmospheric temperature and at a temperature near their boiling point. They find that the evolution of hydrogen which always takes place is accompanied by the precipitation of a mixture of cuprous oxide and metallic copper in proportions which vary with the conditions of the experiment.

When a dilute solution of cupric sulphate is employed, the above-mentioned products are accompanied by a quantity of a green substance, which consists of a mixture of basic hydrated sulphates of copper and magnesium. This substance was observed to form when a saturated solution of cupric sulphate was employed, but it was decomposed again before the reaction was completed.

The time of the reaction varies from ten minutes in the case of a hot strong solution of cupric sulphate to several days, or even a week, when a dilute solution is employed at atmospheric temperature.

The quantities of the three reduction products, cuprous oxide, copper, and hydrogen, were determined under various conditions. A volumetric process depending upon the use of potassium permanganate was employed for the estimation of the cuprous compound when it occurred together with the basic sulphate of copper and magnesium before mentioned.

The authors found in each case which they investigated that the sum of the magnesium equivalents of the cuprous oxide, copper, and hydrogen obtained agrees very closely with the amount of magnesium employed in the experiment. The magnesium is therefore proved to have displaced from the solution of cupric sulphate, substances which are chemically equivalent to it, though only a small and variable proportion of these substances consists of metallic copper. The authors have shown that the nature of the reaction is not influenced by the presence of slight impurities in the cupric sulphate employed by carrying out similar experiments with a specimen of the salt obtained by six successive recrystallisations of a sample which was originally almost pure. Pickering's observation of the formation of a basic sulphate of copper by the decomposition of a solution of cupric sulphate by boiling has been incidentally confirmed, but the formula which the authors attribute to this compound is $4\text{CuSO}_4, 7\text{Cu}(\text{OH})_2, \text{H}_2\text{O}$.

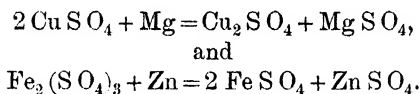
The Interaction of Magnesium and Copper Sulphate. E. Divers. (*Proc. Chem. Soc.*, No. 190.) The author points out that Clowes and Caven (preceding abstract) do not seem to have

recognised the significance of the results of the interaction of magnesium metal and a solution of copper sulphate. A closely analogous case is that of zinc immersed in a solution of an alum. In that case there is free evolution of hydrogen and precipitation of basic sulphate, and, when chromium alum replaces the aluminium salt, there is also reduction of some of the chromic sulphate to chromous sulphate. The only part of the change which finds no parallel in the action of zinc upon chrome alum is that of the deposition of a little copper, but that deposition is quite in accordance with the general behaviour of copper salts. The formation of basic salt and hydrogen is a change independent of that of reduction, and since the alum solution is dialysable into sulphuric acid and basic aluminium or chromium sulphate (besides potassium sulphate), and is also strongly acid in reaction, the action in the case of an alum is really that of dilute sulphuric acid upon the zinc. The gradual precipitation of the previously soluble basic salt as the zinc dissolves in the solution is just what happens when zinc sulphate is dissolved in a dialysed solution of aluminium, or chromium hydrate, or basic sulphate. Similar changes probably occur between copper sulphate and magnesium, or, in a less degree, zinc; for the solution is here also very acid in reaction, and needs only a little boiling to make it deposit basic sulphate. This solution will also show that hydrolysing action upon cane sugar which Long has established in the case of many metallic salts (*Journ. Amer. Chem. Soc.*, 1896, 120), and this property may be regarded as evidence that, like aluminium sulphate, the copper salt is partly hydrolysed into sulphuric acid and soluble basic sulphate, which will be precipitated while magnesium passes into solution.

With regard to the production of cuprous oxide, as a separate reaction, the analogy to the reduction of ferric or chromic sulphate by zinc or magnesium would be at once apparent, if cuprous salt could be actually found in solution. This reduction to cuprous salt is well known to occur readily, when cupric chloride is used in place of the sulphate. But oxylic cuprous salts seem unable to exist. It is, however, not very improbable that in dilute solution, and in presence of much cupric sulphate, a little cuprous sulphate may exist for a short time. However that may be, the author is inclined to regard the precipitation of cuprous oxide during the action of magnesium upon cuprous sulphate as a fact highly favourable to the view that cuprous sulphate is actually formed, part of which quickly decomposes into cupric sulphate and metallic copper, the rest being decomposed by the basic cupric salt into normal

cupric sulphate and cuprous oxide. When finely divided copper is acted upon by nitrogen peroxide, nitric oxide and a copper nitrate are formed, and no nitrite, and this copper nitrate, when touched with water, decomposes into cupric nitrate and bright metallic copper; thus proving, apparently, that in the absence of water cuprous nitrate can exist, and, therefore, by analogy, other oxylic cuprous salts likewise.

With reference to Tilden's suggestion that some of the hydrogen reduces cupric to cuprous oxide, the author points out that hydrogen is not known to have such an action, and that the usual assumption of a more active "nascent" hydrogen coming into play does not rest upon actual knowledge. In the present case, it should be borne in mind that in the reduction of chromic sulphate to chromous sulphate by zinc, hydrogen continues to be evolved, although a large excess of chromic salt is always in contact with the zinc; and further, that in the reduction of ferric salts by zinc, it has been established that this takes place much more rapidly when clean zinc dust is allowed to act on the ferric solution in the absence of excess of acid than when, as is usual, an excess of acid is added to generate hydrogen. The author, therefore, considers it quite admissible to assume that hydrogen plays no part in these reactions, and that the latter occur in accordance with the following equations:—

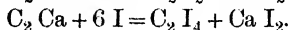
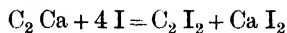


Action of Acetylene on Silver Nitrate. R. Chavastelon. (*Comptes Rendus*, cxxiv. 1364–1366.) When acetylene is passed through an aqueous solution of silver nitrate, a white precipitate is formed, which at first consists of a compound of the composition $\text{C}_2 \text{ Ag}_2, \text{ Ag NO}_3$. This is decomposed by the further action of the gas, so that the final product is silver carbide, $\text{C}_2 \text{ Ag}_2$. The latter is formed at once when acetylene is passed through an ammoniacal solution of silver nitrate.

Formation of Carbides. H. Moissan. (*Comptes Rendus*, cxxvi. 302. From *Pharm. Journ.*) The author has established the fact that potassium, sodium, and magnesium carbides cannot be produced at the temperature of the electric furnace. By the action of cold acetylene gas, or of liquid acetylene, with or without pressure, it is possible to obtain the intermediate potassium and sodium acetylides— $\text{C}_2 \text{ K H}$ and $\text{C}_2 \text{ Na H}$ —in a state of purity, and

by elevating the temperature those bodies can be decomposed, acetylene being disengaged, and potassium and sodium carbides— C_2K_2 and C_2Na_2 —left as residues. At a still higher temperature the carbides are dissociated into the metals and carbon, as in the case of the carbides of the alkaline earths, though a much higher temperature is required. The same holds good with magnesium carbide, and it is pointed out that the stability of these carbides, under increasingly greater variations of temperature, continues to increase from the alkaline metals up to those of the alkaline earths. Details are given in the same paper of experiments with lithium and calcium carbides, both of which can be decomposed in the electric furnace by currents of high intensity, though the highest temperature is required in the case of the calcium compound.

Diiodoacetylene and Tetraiodoethylene. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 624, 625.) These two substances have been known for some time, but have recently been made more accessible by improved processes suggested by H. Biltz for their preparation. They are now introduced as therapeutic agents. Diiodoacetylene, C_2I_2 , is a powerful destroyer of micro-organisms, and hence one of the best antiseptics. Tetraiodoethylene, C_2I_4 , is an excellent substitute for iodoform in the antiseptic treatment of wounds. When coarsely powdered calcium carbide is added with continual stirring to a solution of iodine in a concentrated aqueous solution of potassium iodide, the following reactions take place concurrently:—



By decomposing the calcium iodide with hydrochloric acid and adding more calcium carbide, the iodine liberated from the calcium compound can likewise be rendered available for these reactions. The final product readily yields the two iodides of carbon to hot ether, and they may then be separated from each other by crystallisation from glacial acetic acid. The crystals thus separating consist of C_2I_4 only, and a little more of this compound is obtained by concentrating the mother-liquor to one third of its volume by evaporation in a retort. The liquid which distils over along with the acetic acid contains the volatile diiodoacetylene, which can be precipitated from the distillate by the addition of water, and re-crystallised from ligroin.

Diiodoacetylene forms small colourless needles. It is readily soluble in ordinary solvents, highly volatile, and has a disagree-

able odour. When exposed to light it turns pink, owing to a slight liberation of iodine.

Tetraiodoethylene forms yellow lustrous crystals, which are readily purified by re-crystallisation from glacial acetic acid or toluol. It melts at 187° , is odourless and not volatile. It is already in use in France, under the name of diiodoform, as an iodoform substitute.

Preparation of Anhydrous Hydrocyanic Acid and Carbon Monoxide. J. Wade and L. C. Panting. (*Proc. Chem. Soc.*, 1898, No. 190.) On allowing a cold mixture of equal volumes of sulphuric acid and water to drop on to lumps of pure potassium cyanide, hydrocyanic acid, accompanied by mere traces of water, is evolved in almost theoretical quantity. It may be readily collected, with the aid of a suitable condensing apparatus. With concentrated sulphuric acid, on the other hand, under exactly the same conditions, nearly pure carbon monoxide is evolved, likewise in almost theoretical quantity; and, provided certain precautions are taken, it is free from dioxide, and is only contaminated with a small amount of hydrocyanic acid.

Ferrocyanides of Zinc and Manganese. G. C. Stone and D. A. Van Ingen. (*Journ. Amer. Chem. Soc.*, xix. 542-547. From *Journ. Chem. Soc.*) Determinations of the ratio of iron to zinc in the precipitate formed on adding an excess of potassium ferrocyanide to a cold neutral solution of a zinc salt show that it has the composition $\text{Zn K}_2 \text{Fe C}_6 \text{N}_6$; the precipitate obtained when the zinc is in excess has the same composition. Precipitation in cold solutions containing 5 per cent. by volume of hydrochloric acid gives a product $\text{Zn}_{10} \text{K}_8 (\text{Fe C}_6 \text{N}_6)_7$; whilst from hot solutions, either acid or neutral, the compound $\text{Zn}_4 \text{K}_4 (\text{Fe C}_6 \text{N}_6)_3$ is obtained. The precipitate formed in solutions containing one-seventh per cent. by volume of hydrochloric acid had the composition $\text{Zn}_4 \text{K}_4 (\text{Fe C}_6 \text{N}_6)_3$, whilst a salt purchased as $\text{Zn}_2 \text{Fe C}_6 \text{N}_6$ gave numbers corresponding to $\text{Zn}_3 \text{K}_2 (\text{Fe C}_6 \text{N}_6)_2$.

From cold neutral solutions of manganese, the salt $\text{Mn K}_2 \text{Fe C}_6 \text{N}_6$ is precipitated on adding potassium ferrocyanide, when either the latter or the manganese is in excess. Precipitation from a cold solution containing 5 per cent. by volume of hydrochloric acid gives rise to the salt $\text{Mn}_4 \text{K}_4 (\text{Fe C}_6 \text{N}_6)_3$; whilst from hot solutions, whether neutral or acid, the compound $\text{Mn K}_2 \text{Fe C}_6 \text{N}_6$ is precipitated. The same salt is obtained from a cold solution containing one-seventh per cent. by volume of hydrochloric acid.

In the volumetric method of estimating zinc by potassium ferro-

cyanide, using a uranium salt as indicator on a porcelain plate, the end point corresponds with a salt of the composition $\text{Zn}_2 \text{Fe C}_6 \text{N}_6$ when the solution contains one-seventh per cent. by volume of hydrochloric acid; when, however, the solution is hot and contains 10 per cent. of acid, it corresponds with the salt $\text{Zn}_3 \text{K}_2 (\text{Fe C}_6 \text{N}_6)_2$. If the test be made on a filter-paper, so that the uranium does not come into contact with the precipitate, but only with the clear filtrate from it, the end point corresponds with the compound $\text{Zn}_4 \text{K}_4 (\text{Fe C}_6 \text{N}_6)_3$ when the solution is cold and contains one-seventh per cent. of hydrochloric acid; copper salts and ferric chloride, under identical conditions, indicate the same compound. A concentrated solution of cobalt when brought into contact, but not mixed with the zinc solution, also indicates $\text{Zn}_4 \text{K}_4 (\text{Fe C}_6 \text{N}_6)_3$, but very dilute cobalt solution, when mixed with the zinc solution, gives the reaction at a point corresponding with $\text{Zn}_3 \text{K}_2 (\text{Fe C}_6 \text{N}_6)_2$. With cold solutions of manganese containing one-seventh per cent. by volume of hydrochloric acid, strong cobalt and uranium solutions on filter-paper indicate the formation of the salt $\text{Mn K}_2 \text{Fe C}_6 \text{N}_6$, whilst with very dilute cobalt solution the end point corresponds with the compound $\text{Mn}_3 \text{K}_2 (\text{Fe C}_6 \text{N}_6)_2$. The authors consider that cobalt is the most satisfactory indicator, since it develops a colour instantaneously, whilst the others do not.

Calcium Glycerophosphate. H. Adrian and A. Trillat. (*Journ. de Pharm. et de Chim.* [6], vi. 435 and 481. From *Pharm. Journ.*) The authors have examined a number of commercial samples, which have been found to vary very much in physical and chemical characters. Seven samples examined contained from 19.5 to 24.5 per cent. of lime, and from 26 to 33 per cent. of phosphoric acid. In six of these, two were neutral to litmus, one alkaline, and three acid. The solubility of the acid samples in distilled water at 25° C. was markedly in excess of the others, the most soluble dissolving to the extent of 7.6 in 100, while of the neutral sample only 4.05 in 100 was dissolved. The residue, left by this treatment differed widely in composition, being composed chiefly of phosphate of lime, with some sulphate; the latter being probably derived from washing the precipitate with calcareous water. On extracting different samples with boiling alcohol and distilling off the solvent, residues varying in amount from 1.8 to 4.2 per cent. were obtained. These were found to consist of glycerin and free phosphoric acid, the percentage of the former varying from 3.4 to 1.3, and of the latter from 1.5 to *nil*. It is evident, therefore, that commercial calcium glycerophosphate is, at present, far from being a definite body.

The authors propose the following method for the preparation of a pure product:—Equal parts of glycerin and phosphoric acid are gradually heated on a sand-bath in an enamelled vessel to between 130° and 150° C., and maintained at that temperature for 24 hours, when the dark-coloured viscid mass begins to evolve acrid fumes. Instead of calcium carbonate, the authors use tribasic calcium phosphate to combine the free phosphoric acid, since effervescence is thus avoided. The free phosphoric acid forms with this dibasic calcium phosphate; milk of lime is then added in excess, which combines with the glycerophosphoric acid and again precipitates the phosphoric acid as tribasic calcium phosphate, which is filtered out and again used in subsequent operations. The filtrate is concentrated to a pasty consistence, then poured into 10 parts of alcohol, and boiled for an hour. After draining it is again treated with alcohol and precipitated by heating, collected, and dried on the water-bath. The authors have obtained the salt in the form of a microcrystalline powder by precipitating the aqueous solution by boiling, when it forms minute, well-formed needles. These, however, at once lose their crystalline form on exposure to the air, and disintegrate even on the microscope slide while under observation. Analysis of the salt gave figures corresponding to the anhydrous salt of Pelouse, and did not support the statement of Portes and Prunier that it contains two molecules of water. The solubility of the glycerophosphate in water at 25° C. was found to be 4.53 in 100.

Glyceric Ether. C. Stoehr. (*Pharm. Centralhalle*, xxxviii. 441.) Glyceric ether, $C_6H_{10}O_3$, may be readily obtained by distilling glycerin with phosphoric acid, and crystallising the product from ether. It forms lustrous plates or prisms, melting at 124 – 125° C., and boiling at 200° C. It is soluble in water, and forms a crystalline compound with mercuric chloride.

Impurities in Commercial Ether. L. L. A. Prunier. (*Comptes Rendus*, cxxiv. 1028, 1029.) Commercial ether usually contains appreciable quantities of sulphonic derivatives, which can be easily removed by washing with water. Larger quantities of the same derivatives are found in the residues left in the retorts in the preparation of ether. They are formed by the action of sulphuric acid on the acid ethyl sulphate as soon as the temperature reaches or exceeds 140° C.

Preparation of Ether free from Alcohol. P. Fritzsche. (*Zeitschr. für analyt. Chem.*, xxxvi. 302.) The usual process of preparing ether by running alcohol into a heated mixture of alcohol

and sulphuric acid always yields a product containing unchanged alcohol. This contamination may be prevented by passing the vapour through a small flask containing sulphuric acid or preferably acid ethyl sulphate.

Action of Potassium Hydrate on Chloroform, Bromoform, and Chloral. A. Desgrez. (*Comptes Rendus*, cxxv. 780-782.) An aqueous solution of potassium hydrate gradually decomposes chloroform at the ordinary temperature, with evolution of carbonic oxide and the formation of potassium chloride and water. The influence of light or gentle heat accelerates the reaction. Bromoform is acted upon in the same way, but more slowly, while iodoform is not decomposed at all. The action of the alkali upon chloral is quicker than that on chloroform, and results first in the formation of potassium formate and chloroform, and subsequently in the decomposition of the latter in the manner already stated. Alkaline carbonates do not produce this action on chloroform, and alkaline bicarbonates even fail to bring about the partial decomposition of chloral.

Behaviour of Chloral Hydrate towards Ammonium Sulphide. J. Lesinsky and C. Gundlich. (*Amer. Chem. Journ.*, xix. 603-606.) When 10 c.c. of a solution of 2 grammes of chloral hydrate in 25 c.c. of water are mixed with 5 c.c. of yellow ammonium sulphide, the mixture deposits a pinkish or yellowish-brown precipitate after standing for some time. The reaction is greatly accelerated if conducted at an elevated temperature. The nature of the precipitate has not yet been determined.

Action of Nitrogen Trioxide and Tetroxide on Alcohols. J. B. Cohen and H. T. Calvert. (*Proc. Chem. Soc.*, 1897, No. 183.) The authors have found that when nitrogen trioxide or tetroxide dissolved in chloroform is allowed to act upon benzyl alcohol, water is eliminated in both cases, and compounds of the formula $C_6H_5CHN_2O_3$ and $C_6H_5CHN_2O_4$ are probably formed, which rapidly decompose on standing into benzaldehyde, with the separation in the first case of nitric oxide, and in the second of nitrogen trioxide, according to the following equations: (1) $C_6H_5CHN_2O_3 = C_6H_5COH + 2NO$, (2) $C_6H_5CHN_2O_4 = C_6H_5COH + N_2O_3$. The latter substance, which may be termed benzylidene nitrosate, is decomposed by water into a compound of the formula $C_7H_7NO_3$, which is probably identical with a substance obtained by Lippmann and Hawliczek (*Ber.*, 1876, 9, 1463) by the action of nitric acid upon benzaldehyde. By the action of reducing agents it is converted into benzyl alcohol, benzylamine and ammonia.

The Hydrolysis of Starch by Acids. H. Johnson. (*Proc. Chem. Soc.*, 1898, No. 193.) It has been generally believed that the hydrolysis of starch by acids is similar in character to that effected by diastase, except that the maltose, which is the final product of the action of diastase, is transformed by acids into dextrose. An examination of the products of acid hydrolysis shows, however, that these are not identical with those of diastase conversion, and that when starch is hydrolysed by dilute acids there is neither production of amyloins (molecular aggregates of maltose and the amylin group) nor of maltose. The nature of the products resulting from the reaction can be shortly described as follows:—

The cupric-reducing powers and specific rotations of the intermediate substances (fractionated by means of alcohol) as well as those of the total products of conversion, can be expressed exactly in values of dextrose and the amylin group. The relation between the specific rotation and the cupric-reducing power is constant throughout the whole of the reaction, and, given one of these values, the other may be calculated by the equation, $[\alpha]_{D\ 3.86} x^\circ = 195 - (195 - 52.8) K_{3.86}/100$, in which x = the specific rotation, and K = the cupric-reducing power in terms of the percentage of dextrose.

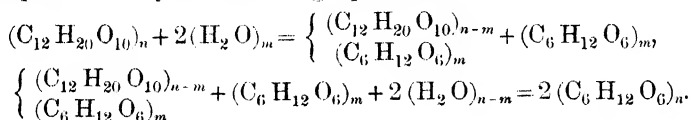
The specific rotations of the intermediate substances (separated from the dextrose by precipitation with alcohol) vary between $[\alpha]_{D\ 3.86}$ 80° and 190° . It should be remembered that the intermediate compounds in diastase conversions have rotations which vary from $[\alpha]_{D\ 3.86}$ 190° to 150° , so that the substances from the acid conversions with rotations which fall as low as 80° must differ in character from those obtained by diastase.

The behaviour of the intermediate substances from the acid conversions, when submitted to dialysis, shows that they are definite compounds, and not mixtures of dextrose and other carbohydrates, as, after purification, they dialyse without undergoing a change in specific rotatory power. Moreover, they are unfermentable in the presence of Saaz and Apiculatus yeasts. When treated with phenylhydrazine acetate, they yield gummy precipitates, and on further hydrolysis with acids are completely transformed into dextrose. Their solubility in alcohol decreases as their specific rotation increases.

The products of acid conversion also differ in a marked degree from those of diastase conversion when submitted to the action of diastase. The fall in specific rotation in the case of the products of acid conversion is extremely limited at any time during the

reaction. Thus the action of diastase on an acid conversion whose rotation has fallen to $[\alpha]_{D, 386} 115^\circ$ is nil. At 140° the fall is 5° or 6° . At 170° the fall is about 10° , the blue coloration produced by iodine disappearing at this point in the conversion under the influence of diastase. As, however, diastase has a slight degrading action on conversions which give no blue coloration with iodine, and have rotations between 140° and 115° , it is possible that an unreducing dextrin may be produced in the splitting up of the starch molecule; the slight fall in the rotation under the influence of diastase could then be explained by the degradation of this dextrin.

The action of dilute acids on starch can be expressed in its simplest form by the following equations:—



Taking into consideration their properties, the substances intermediate between starch and dextrose may be regarded as molecular aggregates of dextrose and the amylin group $(C_{12}H_{20}O_{10})_n$; the name *gluco-amylin*s will accurately describe them. Gluco-amylin with rotations of about $[\alpha]_{D, 386} 80^\circ$ or 90° have been recognised in commercial glucose under the name of gallisin.

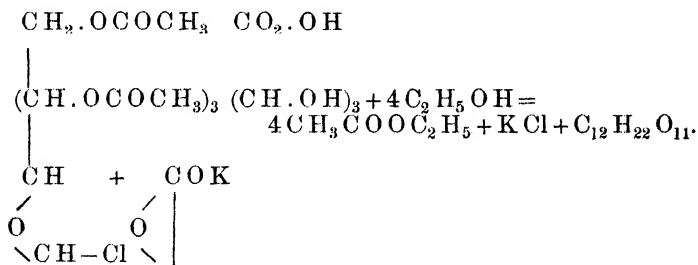
The formation of gluco-amylin by acid hydrolysis is thus explained: acids, being able to hydrolyse free maltose, exercise this action also on the maltose in molecular aggregates, and therefore amyloins at the moment of their formation would be transformed into dextrose and gluco-amylin. The molecule of starch is probably formed by the condensation of a large number of molecules of dextrose. In the first place, two molecules of dextrose condense to form maltose, and then a large number of maltose molecules further condense to form starch.

Soluble Starch. A. Wroblewski. (*Ber. der deutsch. chem. Ges.*, xxx. 2108–2110); also W. Syniewski. (*Ibid.*, 2415–2418.) According to A. Wroblewski, soluble starch is best prepared by treating rice starch with a small quantity of a 1 per cent. solution of potassium hydrate, leaving it for some time, then adding excess of the alkali, and heating on the water bath with repeated shaking for 20 to 30 minutes; the product is then filtered, rendered slightly acid with acetic acid, and precipitated by the addition of alcohol. It may be purified by repeated dissolution in water and precipita-

tion with alcohol, and is thus obtained as a snow-white amorphous substance which is readily soluble in water and leaves hardly any ash upon incineration. It does not reduce Fehling's solution and gives a pure blue coloration with iodine, thus differing entirely from "amylodextrin," which gives a reddish-brown coloration with iodine, and has a slow reducing action on Fehling's solution.

W. Syniewski effects the conversion of starch into its soluble modification by the action of a 9 per cent. solution of sodium peroxide on potato starch suspended in water, and subsequent purification of the product by repeated precipitation with alcohol. In this way, too, it is obtained in a snow-white and almost ash-free condition. It is soluble in 8 parts of cold and in any proportion of hot water, and has a composition represented by the formula $3\text{C}_6\text{H}_{10}\text{O}_5 + \text{H}_2\text{O}$.

Synthesis of Cane Sugar. L. Marchlewski. (*Journ. Soc. Chem. Ind.*, July 31st, 1897.) The author has obtained cane sugar by the action of acetochlorhydrose upon the potassium salt of *d*-fructose. The reaction is expressed by the following equation:—



Pure acetochlorhydrose is dissolved in alcohol, and to the solution freshly prepared potassium levulosate is added. The mixture is left to stand for about seven days at ordinary temperature; to complete the reaction it is heated for half an hour on a water bath; next, the potassium chloride formed is filtered off, the filtrate evaporated at 80°C ., and the residue dissolved in boiling water. The solution obtained is next treated with a solution of calcium hydrate, and the gradually formed precipitate filtered off, stirred in some water, and decomposed with CO_2 . The calcium carbonate is filtered off, and the filtrate purified by calcium hydrate in a similar manner. Finally, the aqueous solution of the sugar is extracted with ether in order to remove the saccharin, and then evaporated *in vacuo*. After some days' standing the cane sugar

formed, crystallizing in the well-known forms. All the reactions and physical properties agree with those of natural cane sugar.

Gentianose. E. Bourquelot and L. Nardin. (*Comptes Rendus*, cxxvi. 280, 281.) Fresh gentian roots are cut into thin slices and added gradually to alcohol of 95° previously heated to boiling, the boiling being continued in a reflux apparatus for 20 to 25 minutes; any ferment present in the root is thus destroyed. The liquid is filtered, distilled, the residue neutralised with calcium carbonate, again filtered, and finally evaporated to a very thick syrup. After remaining at the ordinary temperature for some weeks, the semi-crystalline mass is dissolved in the smallest possible quantity of hot water, and 4·5 parts of hot alcohol of 95° are added for every 1 part of water, after which the liquid is allowed to remain at the ordinary temperature for 15 hours; the clear solution is then decanted off into another vessel, in which it gradually crystallises. The compound is purified by re-crystallisation from alcohol of 95°.

The gentianose thus obtained forms anhydrous lamellæ which burn without residue, and are completely soluble in water, yielding colourless solutions. It melts at 207–209°, and is dextrogyrate; $[\alpha]_D = +31\cdot25^\circ$, and no phenomenon of birotation could be recognised. Gentianose does not reduce cupric salts in presence of potassium hydrate, but if boiled with dilute sulphuric acid, it becomes lævogyrates and acquires considerable reducing power.

Oxy-Cellulose. L. Vignon. (*Comptes Rendus*, cxxv. 450.) Experiments made with various oxidising agents lead to the conclusion that a solution of potassium chlorate acidified with hydrochloric acid is best suited for the conversion of cellulose into oxy-cellulose. The conversion is effected by allowing this solution to act on the cotton at 100° C. for about an hour, and then washing the latter with water. When treated with caustic alkalies, oxy-cellulose is dissolved, and can be re-precipitated from the solution by acids; the solution reduces Fehling's reagent. The author regards the composition of oxy-cellulose as $C_{24}H_{33}O_{21}$ or $4(C_6H_{10}O_5) - H_2 + O$.

Action of Hydrogen Peroxide on Carbohydrates in the Presence of Iron. C. F. Cross, E. J. Bevan, and C. Smith. (*Proc. Chem. Soc.*, No. 194.) The results obtained in 1895 by H. J. H. Fenton, in oxidising tartaric acid by hydrogen peroxide in presence of soluble iron compounds, suggested the application of the method to other hydroxy-compounds, and notably to the carbohydrates. The authors have studied the behaviour of typical hexoses and of

cane-sugar, when treated in aqueous solution with hydrogen peroxide at ordinary temperatures, and, in confirmation of Fenton's observations, have found in this group also that the presence of iron compounds is an essential condition for the production of the characteristic reactions. A convenient proportion of iron (Fe as $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$) is 1/10000 of the weight of a solution containing 4 grammes of the carbohydrate in 100 c.c. The authors reserve for the present any statement of the limiting proportion which may be necessary, and are engaged in ascertaining whether other inorganic compounds may not be found to have similar effects.

With such proportions and with hydrogen peroxide in quantities sufficient to supply 1 or 2 atoms of oxidising oxygen for each molecule of hexose, reaction takes place readily with marked rise of temperature (10 – 20°), but in the absence of iron compounds, all other conditions remaining the same, nothing happens at ordinary temperatures. After reaction, the solutions are acid to the taste. The quantity of acid formed is greater from dextrose than from lævulose. The volatile acids separated by distillation are formic and acetic acids, and represent 15–20 per cent. and 4–7 per cent. respectively of the weight of the dextrose. The non-volatile acids represent about one-half the total acidity, and contain a dicarboxylic acid which is easily isolated by precipitation as lead salt in the presence of acetic acid, and on analysis gives numbers corresponding with those required for tartronic acid.

After removal of the acids, the presence of furfuroids is identified by estimations of furfural in the distillates from hydrochloric acid (sp. gr. 1.08). The quantities obtained from dextrose or cane-sugar are 3–4 per cent., representing 7–9 per cent. of the furfuroid. The products yielding furfural are not acid in character, but there is no evidence that they are pentoses. From lævulose, only traces of these products are formed. The solutions give a well-marked iodoform reaction, indicating that the hexose molecules undergo internal rearrangement, and that the phenomena are not those of a simple oxidation.

The characteristic products of the reaction are separated from solution by the addition of alcohol and ether; on drawing off the denser aqueous layer, a solution is obtained which dries in a vacuum to a gummy solid, destitute of any appearance of crystallisation. These compounds react with phenylhydrazine acetate in the cold, forming osazones, and give evidence of the presence of highly reactive groups by reducing Fehling's solution in the cold. The yield of osazones is considerable, amounting to 30–60 per cent.

of the weight of the carbohydrate in the case of lævulose and of cane-sugar; and to 12–20 per cent. in that of dextrose. Two groups of osazones have been obtained: (1) compounds melting at 185–195° and resembling the glucosazones in properties, but differing from them in composition, the nitrogen (N=17–20 per cent.) being 2–3 per cent. higher; (2) compounds with a low melting point (130°) and freely soluble in hot water. From these results, it might be inferred that the products are the “osones” or “oxyglucoses” of Fischer, but they resist the action of zinc and acetic acid on the one hand, and of bromine on the other, and are not reduced by sodium amalgam in solutions kept slightly acid; properties which differentiate them from the normal carbohydrates and from such of their oxy-derivatives (ketaldoses) as are at present known.

The investigation of the nature of these products is complicated by the fact that no crystalline derivatives other than the osazones have been obtained. No definite acetates or benzoates have been isolated. Some evidence as to their relationship to the original hexoses, however, is obtainable from a closer study of the constants of the reaction. It appears, in the first place, that there is no simple proportion between the quantity of hydrogen peroxide employed and the amount of the characteristic products obtained. Having established this for quantities representing 3, 2, and 1 atom of oxygen for each molecule of the hexose, the authors found that very considerable effects were still produced on further reducing the proportion of peroxide. Thus from 40 grammes of dextrose treated with sufficient peroxide to furnish only 1/10 atom of oxygen for each molecule of hexose, the quantity of osazones formed in the cold from the product of the reaction was 8 grammes, an amount as great, therefore, as that obtained when 10 times this proportion of the peroxide was employed. Similarly, the addition of still smaller quantities of the peroxide to a dextrose solution was found to convert a considerable proportion of the hexose into compounds not fermented by yeast, though reducing Fehling's solution and otherwise resembling the compounds just described.

The authors conclude (1), that hydrogen peroxide acts primarily by determining a constitutional change in the hexose molecule, *i.e.*, by internal rearrangement, such effects bearing no direct proportion to the quantity added, and (2), that the oxidising actions observed, *e.g.*, the formation of dicarboxylic acids, are subordinate or secondary effects.

As regards the nature of the constitutional changes in question,

the reactions of the characteristic products indicate the presence of $-C(OH):C(OH)-$ groups. In the formation of dihydroxymaleic acid from tartaric acid, this radicle results from an actual removal of hydrogen by oxidation, and in the carbohydrates might be formed by internal rearrangement. The authors consider that such a change is the primary effect of contact with the peroxide, although $-CH(OH) \cdot CH(OH)-$ residues also are probably attacked and hydrogen eliminated by direct oxidation.

The obvious bearings of these results upon the problem of plant physiology, from which point of view they are positive and sufficiently established, induce the authors to put forward this preliminary communication without waiting for a definite solution of the constitutional problems, which are still under investigation.

The Oxidation of Tartaric Acid in the Presence of Iron. H. J. H. Fenton. (*Proc. Chem. Soc.*, No. 194.) It has previously been shown that when tartaric acid is oxidised in presence of a small quantity of ferrous iron, one molecule of the acid loses two atoms of hydrogen, giving rise to dihydroxymaleic acid. The most effective oxidising agent for the purpose is hydrogen dioxide, but the result is also brought about by chlorine, hypochlorites, bromine, etc., and by atmospheric oxygen in presence of sunlight. The presence of ferrous iron is essential, but its proportion seems to bear but little relation to the yield of acid in the ordinary course of preparation, the action being, in fact, what is usually termed catalytic. It is necessary that the addition of iron shall precede that of the oxidising agent. From the fact that dihydroxymaleic acid, on heating with water, yields glycollic aldehyde, and that this readily condenses to a hexose, it is evident that the change may afford information with regard to the natural formation of carbohydrates.

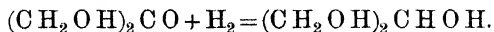
While seeking for a chemical explanation of the part played by the iron, the following may be offered as a provisional suggestion. The two non-hydroxylic hydrogen atoms in tartaric acid may be supposed to possess feebly acid functions owing to the neighbourhood of the CO_2H- and $OH-$ groups, and it is possible that an atom of divalent iron may replace these two hydrogen atoms, giving the compound: $CO_2H \cdot C(OH) < \overset{Fe}{\text{---}} > C(OH) \cdot CO_2H$. On addition of the oxidising agent the iron atom assumes the trivalent state, and can therefore no longer be "retained." The result is an unsaturated acid, and the iron enters into solution as a ferric salt, *e.g.*, ferric tartrate. Dihydroxymaleic acid readily reduces ferric

salts in the cold, experiment indicating that two atoms of iron are reduced by one molecule of the acid, so that the ferrous iron is regenerated at the expense of a portion of the acid.

Preparation of Lactic Acid. O. Kassner. (*Apoth. Zeitung*, 1897, 325.) The author points out that the application of oxide of zinc as a neutralizing agent in the preparation of this acid is less advantageous than the use of chalk, inasmuch as the soluble zinc salt formed interferes with the fermentation by destroying the micro-organisms of the lactic ferment. Instead of the direct production of zinc lactate, he therefore prefers the older process of first producing calcium lactate, and the subsequent decomposition of the solution of this salt by means of the requisite proportion of zinc chloride. An excess of the latter should be avoided, as it is apt to hinder the crystallisation of zinc lactate.

Cerotic Acid and Ceryl Alcohol. R. Henriques. (*Ber. der deutsch. chem. Ges.*, xxx. 1415-1418.) Ceryl cerotate is the principal constituent of Chinese insect wax, which is produced on the Chinese ash *Fraxinus chinensis* by the *Coccus ceriferus*. The author finds this compound to have the composition $C_{52}H_{104}O_2$, that of pure cerotic acid being represented by $C_{26}H_{52}O_2$, and that of ceryl alcohol by $C_{26}H_{54}O$, which numbers differ somewhat from those found by Brodie and by T. Marie.

New Synthesis of Glycerin. O. Piloty. (*Ber. der deutsch. chem. Ges.*, xxx. 3161.) Nitroisobutyl glycerin, obtained from formaldehyde according to Henry's process, is converted into the corresponding hydroxylamine compound, and this by oxidation into the oxime of dioxyacetone. This oxime is then converted into dioxyacetone by the action of bromine, and the product reduced by means of sodium amalgam. The formation of glycerin results from this reduction in accordance with the equation—



Dika Fat. (*Chem. Trade Journ.*, xxi. 179.) Dika fat is extracted from the fruit of the *Irvingia Barteri*, and is extensively used by the natives of the Cameroons for culinary purposes. It is somewhat darker in colour than palm oil, and of about the same consistence. The flavour is described as being most agreeable.

The Melting Point of Soft Paraffins. J. Grier. (*Pharm. Journ.*, 4th series, vi. 293, 294.) The author has found that the ordinary capillary tube method of determining melting points was not of much use for substances of this nature, as the transition

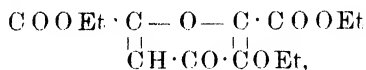
from the natural semi-solid to the liquefied condition is very ill-defined and most difficult to detect. Several other methods were therefore tried, including (1) the ordinary capillary tube method; (2) the capillary U tube method; (3) the conical capillary tube (Kopp's method); the float method (Cross and Bevan); (5) Redwood's method; and (6) the thermometer bulb method. The last-named method has been specially devised and found very suitable for such semi-solid substances as soft paraffin. It is described as follows:—The bulb of a thermometer is thinly coated with the base and is fixed so as to dip just below the surface of mercury contained in a beaker, standing on a piece of wire gauze, and heated slowly and gradually by means of a small flame from a rose burner. As soon as the base liquefies it appears on the surface, forming a ring round the stem of the thermometer, and the temperature is noted. A second determination is made, and when the temperature approaches within two degrees of the melting point found in the first experiment the flame is removed, when the temperature usually rises at least one degree more. Concordant results were obtained by this method. The points to be noted are (1) the bulb should have a thin coating, else the base will be forced up a little below its melting point, although it is easily seen to be still unliquefied, and (2) the heating must be very gradual. The thin coating of the bulb has no appreciable influence on the thermometer reading, and even if it had, a second check thermometer could be used.

The following are the results arrived at:—

	Bulb Method.		Capillary U Tube Method.
	Melting Point.	Solidifying Point.	Temp. at which it Falls in the Tube.
Salvo Petrolia, Red.	35.5° C.		40.5° C.
" Golden	36.5	34° C.	45
" Yellow	36.5		45
" Lemon	37.5		45
" White	37		40.75
Minerolin, White	39	37.5	45
" B	40	39	51
" A	45	45	58.5
Ung. Petrolei	34	33.5	40.75
Ozokerine	39.5	37.5	47.5
Vaselin	34		44.5
" White	31.5	29.5	37.5
Fossiline.	45.7	42	54.5
Cosmine.	37.25		43.6

For soft, buttery substances, like lard, wool fat, soft paraffin, which pass through an intermediate semi-fluid condition before actually liquefying, the bulb method of taking melting points seems to possess special advantages. For firm substances like waxes and cacao butter, which pass at once to the liquefied state without previous softening, Redwood's or the capillary tube method may be employed, but with the latter it is suggested that capillary tubing of a definite internal diameter, say 1 mm., be officially recommended, and that the substances be allowed to stand for at least half an hour before taking the melting point. The bent capillary tube offers the advantage of being free from contact with the water, but the fall of the melted base does not as a rule correspond to the real melting point. The other two methods tried seem to be indicated in the case of firm fats or waxes where an indifferent light is being used, but are not suitable for substances of the nature of soft paraffin.

Constitution of Meconic Acid. A. Peratoner. (*Chem. Zeitung*, xxi. 40.) The results of the author's experiments indicate that triethyl meconate may be represented by the formula



and hence that the free acid is hydroxy-chelidonic acid.

Gelsemic Acid. V. Coblentz. (*Amer. Journ. Pharm.*, 1897, 439-446.) From the results of the author's experiments, the composition of gelsemic acid may be represented by the formula $\text{C}_{13}\text{H}_9\text{O}_3(\text{OH})_2$. Considering the active reducing character of this principle it is highly probable that either an aldehyde or a ketone group is also present. This point will have to be determined by further experiments. Robbin's statement that gelsemic acid is identical with æsculin, has been already disputed by Wormley and subsequently by the author, and is now farther disproved by additional observations. The following differences between these two substances has been established :—

Æsculin.

$\text{C}_{15}\text{H}_{16}\text{O}_9 + 1\frac{1}{2}\text{H}_2\text{O}$ —melts at 160°C .

Forms a penta-acetyl derivative, melts at $203-206^\circ\text{C}$.

Splits up into sugar and æsculetin.

Bromine derivative melts at $193-195^\circ\text{C}$.

Chloro subst. product not prepared.

Gelsemic Acid.

$C_{13}H_{11}O_5$ —melts at $206^\circ C$.

Forms a diacetyl derivative, melts at $180^\circ C$.

Does not hydrolyze.

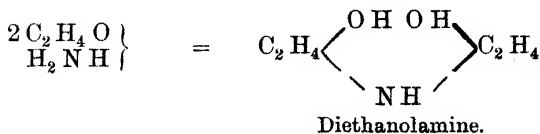
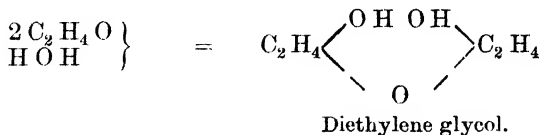
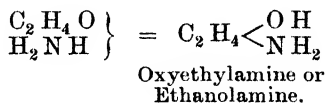
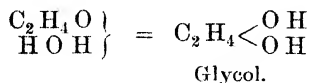
Bromine derivative melts at $250^\circ C$.

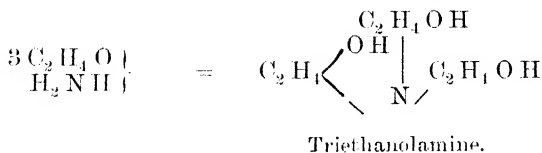
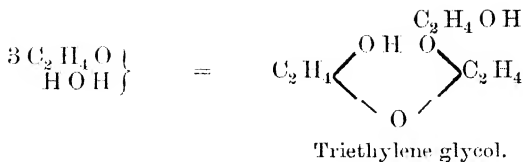
Chloro subst. product melts at $190^\circ C$.

Preparation of Pure Oxalic Acid. R. Riechelmann. (*Chem. Centr.*, 1897, 539.) The author finds that a perfectly pure preparation can be obtained from the commercial acid by re-crystallising the latter first from ether and subsequently from water.

Compounds of Uric Acid with Formaldehyde. K. Weber and B. Tollens. (*Liebig's Annalen*, cxcix. 340–346.) Uric acid forms two compounds with formaldehyde, one of which contains two molecules of the latter to one molecule of the former, and is a crystalline, sparingly soluble product of the formula $C_7H_8N_4O_5$; while the other is an amorphous, readily soluble substance, containing formaldehyde and uric acid in the proportion of four molecules to one.

Oxyethyl Bases. L. Knorr. (*Ber. der deutsch. chem. Ges.*, 1897, 909. From *Pharm. Journ.*) Oxyethylamine, $OH \cdot C_2H_4NH_2$, and the corresponding secondary and tertiary amines $(OH \cdot C_2H_4)_2NH$ and $(OH \cdot C_2H_4)_3N$, which may be regarded as amides of glycol, are of interest as the first oxygenated bases prepared synthetically and on account of their relation to choline. Their formation by the reaction of one, two, or three molecules of ethylene oxide with ammonia is analogous to the formation of glycols by the reaction of ethylene oxide with water.





The author finds that these addition compounds, which are formed simultaneously, can be separated in the free state by fractional distillation, and he has described their several characters.

ETHANOLAMINE, $\begin{array}{c} \text{C}_2\text{H}_4\text{OH} \\ \text{C}_2\text{H}_4\text{NH} \end{array}$, is a thick colourless liquid having an alkaline reaction and an odour resembling that of ethylene-diamine. It absorbs water and carbonic acid from the air, dissolves in water or alcohol in all proportions, but only slightly in ether. The aqueous solution acts upon the skin like potash or soda solution. Like hydrazine-hydrate, and ethylene-diamine, the base can be easily separated, even from weak solutions, in the anhydrous state, by distillation. The base boils at 171°C ., and in its other physical characters closely resembles glycol.

DIETHANOLAMINE, $\begin{array}{c} \text{H O C H}_2 \cdot \text{C H}_2 \\ \text{H O C H}_2 \cdot \text{C H}_2 \end{array} > \text{N H}$, is a thick, syrupy liquid, crystallisable when cooled; the crystals melt at 28°C .; it is very alkaline.

TRIETHANOLAMINE, $\begin{array}{c} \text{C H}_2 \cdot \text{C H}_2\text{OH} \\ \text{N} < \begin{array}{c} \text{C H}_2 \cdot \text{C H}_2\text{OH} \\ \text{C H}_2 \cdot \text{C H}_2\text{OH} \end{array} \end{array}$, is a thick liquid boiling

at $277\text{--}279^\circ$ under a pressure of 150 mm.; it is a strong base, and can be separated from an aqueous solution by caustic potash, with which it combines, as glycol does, like an acid. When diethanolamine is heated to 160°C . with sulphuric acid (70 per cent.) it is converted by dehydration into morpholin, a compound bearing some relation to morphine.

Basic Phenylhydrazine Hydrochloride. S. Dumont. (*Chem. Zeitung*, xxi. 511.) When phenylhydrazine and carbon tetrachloride are mixed at ordinary temperatures, a separation of brilliant silky needles occurs. If the mixtures be warmed, small

pearly scales are obtained which are very soluble in water and are at the same time decomposed in that liquid, giving off small bubbles of nitrogen. These crystals are two isomeric forms of the same substance, basic phenylhydrazine hydrochloride, $(C_6H_5NH \cdot NH_2)_2HCl$. Ether, chloroform and other solvents remove the phenylhydrazine from combination. The salt is very volatile at $100^\circ C$., and at $195^\circ C$. it decomposes entirely without melting.

Action of Antipyrine on Pyrogallol. G. Patein and E. Dufau. (*Bull. de la Soc. Chim.* [3], xv. 1048-1050.) On mixing strong aqueous solutions of antipyrine and pyrogallol, an oily compound of the composition $C_6H_3(OH)_3, C_{11}H_{12}N_2O$ is produced, which subsequently forms colourless crystals melting at $77-78^\circ$.

When gallic acid is used instead of pyrogallol in the same manner, no real chemical combination with the antipyrine seems to take place.

Action of Tannin and of Gallic Acid on Pyridine and Piperidine. W. O. de Coninck. (*Comptes Rendus*, cxxiv. 562, 563.) Neither dry tannin nor an alcoholic solution of tannin gives any precipitate when added to a solution of pyridine in an equal volume of absolute alcohol, but on the addition of water a precipitate at once forms. With an alcoholic solution of piperidine, an emerald-green coloration is produced on the addition of dry tannin, and an immediate white precipitate on the addition of an alcoholic solution of tannin. Neither dry tannin nor an ethereal solution of tannin gives any precipitate when added to an ethereal solution of pyridine; a white precipitate is, however, formed on the addition of water. With an ethereal solution of piperidine, a solution of tannin in ether gives a precipitate, but dry tannin does not. The following reactions serve to readily distinguish between pyridine and piperidine.

A freshly prepared solution of gallic acid produces neither precipitate nor coloration when added to an aqueous solution of pyridine; with piperidine, a pale rose coloration is at first produced, becoming darker in colour, and finally of a deep yellow. With pyridine, pyrogallol gives a pale yellow coloration appearing only after some time, but with piperidine an immediate yellow coloration, becoming in turn deep yellow, dark brown, and brownish-black. Catechol gives no reaction with pyridine, but with piperidine a violet coloration at first, becoming successively pink and yellow.

Compounds of Piperidine with Phenols. O. Rosenheim and P. Schidrowitz. (*Proc. Chem. Soc.*, 1897, No. 185.) With the object of obtaining substances of the general formula $(C_6H_{6-m})(C_5H_{10}N)_m$ which seemed to be of interest on account of their relation to the phenylenediamines and polyamines, the authors have studied the action of piperidine on phenols and their derivatives in the presence of dehydrating agents. Although so far unsuccessful in this direction, a series of addition products in the nature of salts were observed, in which piperidine acts as the base, and the phenol as the acid. They are well crystallised compounds, easily obtained by the interaction of their components, usually in ethereal solution. They are resolved into their constituents by strong acid or alkalis. M. Oechsner de Coninck has described a number of colour reactions obtained by the action of piperidine and other bases on phenols in dilute aqueous solution, but does not seem to have observed the formation of the addition compounds described in this paper.

The influence of the number and position of the oxy- and nitro-groups in the phenols on the additive capacity of the piperidine molecule was studied, but no general rule could be deduced.

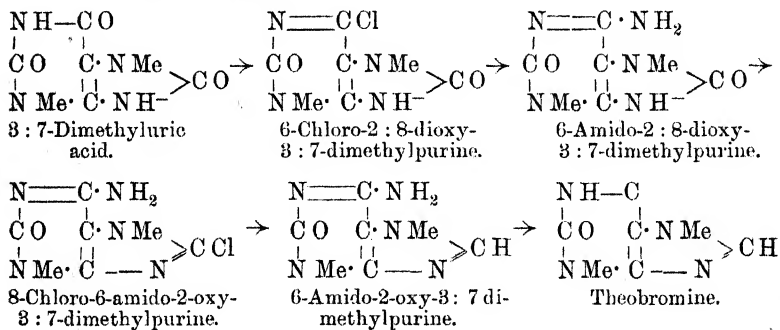
The following compounds were analysed, and are described in the paper: Compounds of piperidine (1 mol.) with pyrocatechol (2 mols.), guaiacol (2 mols.), hydroquinone (1 mol.), pyrogallol (1 mol.), vanillin (1 mol.), *o*- and *p*-nitrophenol (1 mol.), picric acid (1 mol.), 1 : 2 : 4-dinitronaphthol (1 mol.). Phenol, *p*-chlorophenol, resorcinol, phloroglucinol, *m*-nitrophenol, and α - and β -naphthol did not furnish crystalline compounds.

Action of the Electric Current on some Alkaloids. H. Pommerelne. (*Archiv der Pharm.*, 1897, 364-368.) Caffeine when decomposed by the electric current yields malic acid, formic acid, ammonia, and methylamine, whilst morphine, when submitted to the same treatment, gives rise to oxydimorphine, and quinine to thalleioquinine.

A New Alkaloid of Coffee. A. Forster and R. Riechelmann. (*Chem. Centr.*, 1897, 1260.) After the caffeine has been extracted from an aqueous decoction of coffee by means of chloroform, an alkaloid which is not removed by that solvent is left in the aqueous solution, from which it can be precipitated by phosphomolybdic acid. On mixing the precipitate with water and milk of lime, drying up the mixture by means of plaster of Paris without heat and then extracting with alcohol, the filtered solution leaves on evaporation a brown oil, which crystallises slowly and

possesses the characters of an alkaloid. This new base differs from caffeine by its insolubility in chloroform, its failure to give the murexide reaction, and by its being precipitated by picric acid. It is probably identical with Paladino's "caffearine."

Synthesis of Theobromine. E. Fischer. (*Ber. der deutsch. chem. Ges.*, xxx. 1839-1845. From *Journ. Chem. Soc.*) 3 : 7-Dimethyluric (γ -dimethyluric) acid has now been prepared synthetically, and from it dimethyldioxychloropurine (chlorodioxydimethylpurine) can be obtained by the combined action of phosphorus pentachloride and oxychloride. The product of the latter reaction, when heated at 130° with four times its weight of aqueous ammonia (saturated at 0°) for 3 hours in a sealed tube, yields 6-amido-2 : 8-dioxy-3 : 7-dimethylpurine; when heated, this decomposes without melting. It forms salts with acids, and also yields sodium, potassium, and ammonium derivatives, the latter of which is decomposed on the water bath. When heated for 4 hours at 170° with ten times its weight of phosphorus oxychloride, it yields 8-chloro-6-amido-2-oxy-3 : 7-dimethylpurine, which crystallises with $3\text{H}_2\text{O}$, decomposes without melting when heated, and has basic properties. This substance, when warmed with four times its weight of hydriodic acid of sp. gr. 1.96 and a little powdered phosphonium iodide, is reduced to 6-amido-2-oxy-3 : 7-dimethylpurine, which crystallises with $3\text{H}_2\text{O}$, decomposes when heated, and is still unmelted at 380° , and has basic properties; when dissolved in dilute sulphuric acid, and heated with sodium nitrate, it yields theobromine, to which the formula given below must be assigned in consequence.



Derivatives of Theobromine. H. Brunner and H. Leins. (*Ber. der deutsch. chem. Ges.*, xxx. 2584-2587.) The *propyl*, *isopropyl*, *butyl*, and *amyl* derivatives of theobromine were obtained

by heating silver theobromine with the corresponding iodide. All these substances form crystalline granules melting above 270° . *Nitro-theobromine*, $\text{N O}_2 \cdot \text{C}_7 \text{H}_7 \text{N}_4 \text{O}_2$, obtained by the direct action of nitric acid on theobromine, forms a pale yellow, micro-crystalline powder, which can be sublimed. The corresponding *amido*-compound is sparingly soluble in alcohol and can also be sublimed.

Researches on Corydaline. W. H. Martindale. (*Pharm. Journ.*, 4th series, vi. 571-573.) In order to further investigate this alkaloid and some of its decomposition products, the author worked up a considerable quantity of the tubers of *Corydalis cava* by Ehrenberg's method, following the directions given by Freund and Josephy. The various bases were separated by fractional crystallisation, and the corydaline finally purified by repeated recrystallisation from alcohol. The pure alkaloid was found to melt at $134\text{--}135^{\circ}\text{C}$. It turns yellow on exposure, owing to oxidation to dehydrocorydaline, which latter can be readily removed by washing with alcohol. The numbers obtained by the author in the combustion of corydaline confirm the formula $\text{C}_{22} \text{H}_{27} \text{N O}_4$. The gold salt was prepared and found to agree with Ziegenbein's formula $(\text{C}_{22} \text{H}_{27} \text{N O}_4 \cdot \text{H Cl})_2 \text{Au Cl}_3$. The platinum salt and the sulphocyanide were also prepared and analysed.

The main part of the author's research is devoted to a study of the product of reduction of dehydrocorydaline and a comparison of its properties with those of natural corydaline. His results demonstrate that the base formed from dehydrocorydaline by assumption of four atoms of hydrogen possesses the same composition and the same melting point as natural corydaline, that, with one or two exceptions, it yields similar salts to those of the latter, but that this artificial base is completely inactive towards a ray of polarised light, and finally, that it is physically isomeric with natural corydaline. The original paper should be consulted for further particulars.

Crystalline Eserine (Physostigmine). N. A. Orloff. (*Pharm. Zeitschr. für Russl.*, xxxvi. 213, 214.) The author has obtained this alkaloid in a crystalline form, by precipitating it from an aqueous solution of the sulphate by means of ammonia, allowing the precipitate to remain in the liquid for some time, and shaking occasionally.

A New Reaction of Eserine (Physostigmine). A. J. F. da Silva. (*Zeitschr. für analyt. Chem.*, xxxvi. 540.) Eserine or any of its salts, when dissolved in fuming nitric acid, yields a yellow solution which, on warming on a water bath, becomes darker and leaves

a green residue. The latter dissolves with a green colour in water and strong alcohol; dissolved in dilute nitric acid, the solution shows a greenish-yellow fluorescence in transmitted light, and a blood-red one in reflected light.

Strophanthin and Strophanthidin. F. Feist. (*Ber. der deutsch. chem. Ges.*, xxxi. 534-541; *Journ. Chem. Soc.*, June, 1898.) Strophanthin from kombé seeds has the properties previously described by Fraser. It is free from nitrogen, does not reduce Fehling's solution, is optically inactive, readily absorbs moisture, and is capable of forming several hydrates. It loses part of this water when placed over sulphuric acid or when gently warmed, but the last portions of water are difficult to remove. After drying over sulphuric acid, it melts and decomposes at 170° ; the author suggests the formula $C_{32}H_{48}O_{16}$. When hydrolysed, strophanthin yields strophanthidin, which is insoluble in water, and a compound, $C_{13}H_{24}O_{10}$, which is readily soluble in water, besides a sugar or mixture of sugars containing only minute quantities of glucose. The compound, $C_{13}H_{24}O_{10}$, melts at 207° , dissolves with the greatest readiness in water, is also soluble in hot ethylic alcohol or acetone, very sparingly in methylic alcohol, and practically insoluble in ether or light petroleum; it reduces Fehling's solution only after prolonged boiling, does not react with phenylhydrazine, is not directly fermented by yeast, and is slightly dextrorotatory $[\alpha]_D = +8^{\circ} 24'$ (in 5.76 per cent. solution). On oxidation, it yields oxalic acid, but neither saccharic nor mucic acid, and when boiled with hydrochloric or with sulphuric acid at 120° , it gives a product which reduces Fehling's solution.

A solid sugar melting at 95° was also isolated from the aqueous solution; it was separated from the compound, $C_{13}H_{24}O_{10}$, by its solubility in methylic alcohol. It reduces Fehling's solution, but does not yield a sparingly soluble osazone.

Strophanthidin melts at $169-170^{\circ}$, decomposes at 176° , and on again cooling melts at 232° . It has the composition $C_{26}H_{38}O_7 + 1\frac{1}{2}H_2O$, and on drying readily loses $1H_2O$. It dissolves in concentrated sulphuric acid, yielding a brick-red solution, does not reduce Fehling's solution, and decolorises bromine but slowly. When oxidised with chromic anhydride, it yields benzoic acid, but on oxidation with alkaline permanganate, the chief products are oxalic and acetic acids. When hydrolysed by boiling with alkali solution and then acidified, a mixture of two compounds is obtained. The chief product ($C_{24}H_{30}O_5 + 1\frac{1}{2}H_2O$) is a yellow, crystalline substance melting and decomposing at 294° ; in the

anhydrous form, it decomposes at $350-360^{\circ}$ without melting. When freshly prepared, it is readily soluble in sodium carbonate, but after some time it can only be dissolved by warming with alkali; it is readily soluble in alcohol and acetone, more sparingly in methylic alcohol, and is insoluble in light petroleum or ether. When heated with a 3 per cent. solution of hydrogen chloride in alcohol, it yields a white, amorphous substance with a high melting point.

A second compound, $(C_7H_{10}O_2)_x$, obtained on hydrolysis, is much more readily soluble in methylic alcohol; it crystallises in needles, melts at 198.5° , and is insoluble in sodium carbonate, but dissolves in sodium hydrate solution. It dissolves in concentrated sulphuric acid, yielding a brick-red solution, and on the addition of water a blue, flocculent precipitate is obtained. It is also soluble in concentrated nitric acid, and the addition of water to this solution causes no precipitate (difference from strophanthidin).

Alkaline permanganate converts strophanthidin into an amorphous substance, soluble in alkali, alcohol, and chloroform, but insoluble in water, ether, light petroleum, or cold acetone. Its melting point is above 300° .

The Alkaloids of Hyoscyamus and Scopola. L. Merck. (*Pharm. Journ.*, 4th series, v. 41, 42, from a paper read before the New York section of the Society of Chemical Industry.) The author reviews the recent literature of this subject and particularly the discussion carried on within recent years by E. Schmidt and O. Hesse with regard to hyoscyamine and scopolamine. He points out that the name hyoscyamine was first given by Ladenburg to a henbane base which he believed to be an isomeride of atropine and hyoscyamine of the formula $C_{17}H_{23}NO_3$. The existence of an alkaloid of that composition in henbane has, however, never been proved by subsequent investigations, either by Ladenburg or others. On the other hand, it has been shown by Hesse that the henbane alkaloid in question has a composition corresponding to the formula $C_{17}H_{21}NO_4$, while Schmidt has pointed out that the latter is precisely the formula which he has established for scopolamine, the alkaloid of scopol root, and that the base predominating in commercial hyoscyamine salts appears identical with the pure scopolamine alkaloid. He (Schmidt) therefore argues in favour of the abandonment of the name hyoscyamine and the adoption of the name scopolamine, whereas Hesse suggests the retention of the name hyoscyamine and the abandonment of that of scopolamine. So far, therefore, as pure hyoscyamine and pure scopolamine are concerned,

the main difference between Schmidt and Hesse is one of nomenclature rather than of fact. The only real difference between these two investigators has reference to the optically inactive alkaloid accompanying pure scopolamine (hyoscyne) in scopol root, this inactive constituent being regarded by Hesse as a distinct alkaloid, atropine, while, in Schmidt's opinion, it is merely a modification of scopolamine, such as is readily formed from the normal base, under the influence of alkalis, etc. In view of the latest results published by Hesse on this subject, the author of the present paper (L. Merck) seems to incline to the conclusion that the opinion of that chemist respecting the individuality of atropine is fairly borne out by both optical and physiological observations.

Derivatives of Strychnine. H. Rumpel. (*Archiv der Pharm.*, ccxxxv. 398-400.) The author describes *strychnine acetophenone bromide* and likewise the corresponding chloride. The former of these is obtained in colourless needles on adding a solution of strychnine to a chloroform solution of bromacetophenone. The chloride is obtained by treating the bromide with silver chloride. For further particulars, the original paper should be consulted.

Strychnine Hydride. H. Dreser. (*Chem. Zeitung*, xxi. 803.) The reduction product obtained by the action of metallic sodium on a boiling alcoholic solution of strychnine is shown by the author to be strychnine hydride, which exerts a physiological action markedly different from that of strychnine, and greatly resembling that of morphine. On frogs it acts as a narcotic paralytant, similar to but more powerful than morphine, and does not give rise to tetanic convulsions. Although its narcotic action is very marked and is capable of neutralising the tetanic action of strychnine, it cannot be employed as an antidote for that alkaloid, since it rapidly produces paralysis of the respiratory system.

The Aconite Bases. J. T. Cash and W. R. Dunstan. (*Chemist and Druggist*, lii. 313, from *Proc. Royal Soc.*, lxii. 338.) The authors find that the extraordinary toxic power of aconitine is mainly dependent on the presence of the acetyl radical in the molecule, whilst the specific action of benzaconine depends on the existence in its molecule of the benzoyl radical. Aconine, which contains neither the acetyl nor benzoyl group, is very inert, but both that alkaloid and benzaconine—the latter in less degree—are said to act as antidotes to aconitine. It is stated by the authors that neither the composition nor constitution of aconitine can yet be regarded as settled.

Thebaine. M. Freund. (*Ber. der deutsch. chem. Ges.*, xxx. 1357–1393.) The author gives an interesting account of a series of researches on the constitution of thebaine and the relation of this base to morphine and codeine. Reference should be made to the original paper, which cannot be adequately dealt with in the form of a brief abstract.

Chelidonine. A. J. G. Tyrer. (*Apoth. Zeitung*, xii. 442. From *Pharm. Journ.*) The material operated upon was obtained partly from E. Merck, of Darmstadt, and partly prepared from fresh chelidonium roots. In both cases the base crystallised from alcohol in transparent tables melting at 135° C. In its behaviour to reagents the base corresponded with the accounts given by Henschke and Selle (*Archiv Pharm.*, 1888 and 1890), and its composition was found to be the same as those authors state ($C_{20}H_{19}NO_5 + H_2O$).

Of the salts, the hydrochloride hydrobromide and phosphate were prepared and analysed.

From Henschke's account of the behaviour of chelidonine towards ethyl-iodide, it may be inferred that the base is tertiary, and on attempting to prepare the corresponding methyl compound, it was found that methyl-iodide had as little action at 100° C. as ethyl-iodide. At 130° to 140° C. reaction took place, and a crystallisable compound was obtained, having a composition represented by the formula $C_{20}H_{19}NO_5 \cdot CH_3I$.

Henschke's observations as to the behaviour of the base with acetic anhydride or benzoic anhydride did not lead to conclusive results as to the number of H O groups in the base, and further experiments were made in that direction, with the result of showing that only one of the five oxygen atoms is present in the base as an H O group.

The compounds obtained had the composition represented by the following formulæ:—

Mono-acetyl-chelidonine, $C_{20}H_{18}(C_2H_3O)NO_5$.

Mono-benzoyl-chelidonine, $C_{20}H_{18}(C_7H_5O)NO_5$.

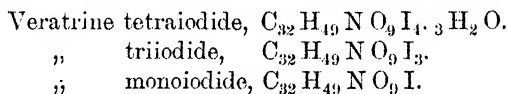
The elimination of water mentioned by Henschke could not be observed. By treatment with hydroxylamine a crystalline oxime was obtained having the composition represented by the formula $C_{20}H_{19}NO_4 \cdot N \cdot OH$.

Some other reactions with phenylhydrazine, sodium amalgam, iodine and potassium ferricyanide had not been sufficiently studied to admit of the results being recorded.

Veratrine. G. B. Frankforter. (*Amer. Journ. Pharm.*, 1897, 372, 373.) The substance commonly known in pharmacy as veratrine, varies widely in its composition, and its chemical, physical, and physiological properties. The introduction of the so-called "Merck veratrine" has changed matters somewhat, although samples of this brand have also been found to vary in their general properties. One of the causes of this variation is the extreme difficulty with which the alkaloid crystallises, thus almost excluding the most important means of purification, but the chief reason of the wide variation of this preparation in the past lies in the fact that almost every one of the earlier investigators has applied the name veratrine to a different alkaloid, or to a mixture of alkaloids.

The author has operated on a sample of crystallised veratrine, which was of a light grey colour, and appeared, when highly magnified, in imperfect granular crystals. It was slightly soluble in water; very soluble in methyl, ethyl and amyl alcohols, and in ether, acetone, chloroform and carbon bisulphide. Its melting point after repurifying was 146–148° C., and its identity with that described by Merck and Ahrens was established by elementary analysis, as well as by the melting point of the gold double salt. The formula was ascertained to be $C_{32}H_{49}NO_9H_2O$.

The following iodine compounds were prepared and studied:—



Other compounds were prepared and investigated as follows:—

Chloralhydroveratride, $CCl_3CH(OC_{32}H_{49}NO_8)_2$.

Veratrine methyl iodide, $C_{32}H_{49}NO_9CH_3I$.

,, methylhydroxide, $C_{32}H_{49}NO_9CH_3OH$.

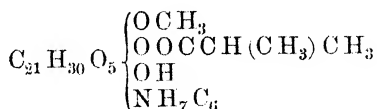
,, methylhydroxyhydrochloride, $C_{32}H_{49}NO_9CH_3OH \cdot HCl$.

,, ethylbromide, $C_{32}H_{49}NO_9C_2H_5Br$.

,, allyliodide, $C_{32}H_{49}NO_9C_3H_5I$.

The author concludes with the statement that the structural formula of veratrine is still unknown. From the odour of picoline during destructive distillation, and the isolation of β picoline by Ahrens, it is evident that veratrine is a pyridine derivative, resembling nicotine in many respects. Whether both cevadic and tiglic acids are present, remains for future experiments to determine. The work of Schmidt and Köppen indicates the presence of

both acids, while the researches of Wright and Luff would indicate that these isomeric acids are converted into each other by special reagents. Assuming that but one acid is present, the following formula may be assigned to veratrine :—



Further experiments in this direction are at present in progress.

Pilocarpidine. C. E. Merck. (*Chem. Centr.*, 1897, 476.) The author has been unable to confirm Harnack's statement that pure pilocarpidine may be obtained by means of the platinochloride. He finds also that the aurochloride is slightly soluble in water; this salt, $C_{10}H_{14}N_2O_2 \cdot HAuCl_4$, which melts at $125-128^\circ$ and crystallises from glacial acetic acid in needles or prisms, is decomposed by sulphuretted hydrogen, yielding pilocarpidine hydrochloride, whose platinochloride, $(C_{10}H_{14}N_2O_2)_2 \cdot H_2PtCl_6 + 4H_2O$, melts at 100° ; the anhydrous salt melts at $186-190^\circ$; Harnack states that the platinochloride decomposes at 130° . Pure pilocarpidine, which the author obtains from the aurochloride, is an alkaline syrup rather easily soluble in water, and has a specific rotatory power $[\alpha]_D = +72^\circ$. It is decomposed by concentrated potassium hydrate solution at 200° with liberation of dimethylamine. Hardy and Calmels state that they have obtained pilocarpine from pilocarpidine by means of methylic iodide, but the author has prepared pilocarpidine methiodide, converted it into the corresponding chloride, and obtained a platinochloride, $(C_{11}H_{16}N_2O_2)_2 \cdot H_2PtCl_6 + 4H_2O$, which softens at 175° , melts at 178° , and is not identical with pilocarpine hydrochloride.

Isomerism of Pilocarpine and Pilocarpidine. A. Petit and M. Polonovski. (*Journ. de Pharm.* [6], vi. 8-11.) See also *Year-Book of Pharmacy*, 1897, 58. The authors now show that these two bases are isomeric, and that no methyl alcohol is obtained when pilocarpine is converted into pilocarpidine by boiling it with an aqueous solution of sodium hydrate. Hence pilocarpine cannot have the constitution suggested by Hardy and Calmels. Pilocarpine hydrochloride may also be quantitatively converted into the pilocarpidine salt by heating it for a few minutes to a temperature slightly above its melting point.

Pilocarpine and Pilocarpidine. C. E. Merck. (*Pharm. Journ.*, 4th series, vi. 385, from *Archiv der Pharm.*, ccxxxvi. 141.) The

author has already shown that the base to which Harnack gave the name of pilocarpidine is not convertible into pilocarpine by methylation, and that the isomer it yields differs from pilocarpine in being insoluble in water. Further investigation of the subject has led him to the conclusion that pilocarpine and pilocarpidine are not, as Petit and Polonovski consider, isomeric, but entirely different in composition. He suggests that the discrepancies have arisen by the name pilocarpidine being given to different bases by the several chemists and not confined to that first described by Harnack as having a composition represented by the formula $C_{10}H_{14}N_2O_2$ (*Ann. Chem.*, 238, p. 230). On repeating the experiments of Petit and Polonovski and heating pilocarpine hydrochloride for some time to a temperature of $200^\circ C.$, the author obtained similar results, the product having lower rotatory power and the gold or platinum salts lower melting points. But when pilocarpidine hydrochloride (Harnack) was subjected to the same treatment it underwent a similar change, though that should not have been the case if the inferences of Petit and Polonovski were correct. Hence it is inferred that the substance to which they give the name pilocarpidine is merely pilocarpine more or less altered. On subjecting pilocarpine hydrochloride to the action of strong hydrochloric acid, by which treatment Hardy and Calmels found it to be convertible into a salt of pilocarpidine, the author was equally unsuccessful in obtaining that result (*Bull. Soc. Chem.*, xlviii. p. 234). The effect of long-continued boiling with water was stated by Hardy and Calmels to result in the conversion of pilocarpine into pilocarpidine, according to the equation—



but on repetition of the experiment no indication of such a change could be detected.

Hydrocinchonine. O. Hesse. (*Liebig's Annalen*, ccc. 42-59.) The author has further investigated this base which was first recognised as an impurity in commercial cinchonine sulphate by Caventou and Willm, who obtained it from this salt by oxidation with potassium permanganate. It is the same alkaloid as the one referred to by Skraup as cinchotine. The proportion in which it occurs in cinchona bark is small, its most profitable source being the bark of *Remijia purdicana*, in which it also occurs associated with cinchonine. The two mixed bases are best separated by converting them into platinum salts in a very slightly acid solution,

so that the excess of hydrochloric acid does not exceed $\frac{1}{4}$ molecule of HCl, and removing the flocculent hydrocinchonine salt from the granular platinum salt of cinchonine. Hydrocinchonine was then obtained by treating the platinum salt with ammonia and recrystallising from hot alcohol.

Hydrocinchonine melts at 268–269°. A 0.6 per cent. solution in absolute alcohol has the specific rotatory power $[\alpha]_D = 204.5^\circ$, whilst a 5 per cent. solution in a mixture of chloroform and absolute alcohol (2:1) has the specific rotatory power $[\alpha]_D = 188.2^\circ$; an aqueous 5 per cent. solution of the sulphate has the specific rotatory power $[\alpha]_D = 224.2^\circ$. The *normal platinochloride*, $(C_{19}H_{24}N_2O)_2 \cdot H_2PtCl_6$, forms a yellow, flocculent precipitate, which soon changes into orange needles; it is anhydrous, and dissolves with difficulty in water. The *acid platinochloride*, $C_{19}H_{24}N_2O \cdot H_2PtCl_6$, is obtained as a yellow, flocculent precipitate, which undergoes no change in contact with the mother liquor; it contains $2H_2O$, and when prepared in an acid solution, separates in long prisms containing $4H_2O$.

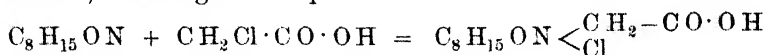
The sulphate occurs in four modifications, differing from one another in the amount of water of crystallisation which they contain. The form which has been already described contains $12H_2O$, and crystallises in long, lustrous needles; a second modification crystallises in leaflets which gradually change into tetragonal double pyramids and contain $9H_2O$. The sulphate also crystallises in forms containing $6H_2O$ and $2H_2O$. A 5 per cent. solution of the dried salt in chloroform has the specific rotatory power $[\alpha]_D = 138.0^\circ$, a solution of the same concentration in absolute alcohol giving $[\alpha]_D = 160.8^\circ$.

Acetylhydrocinchonine and *hydrocinchoninesulphonic acid* are also described in this paper.

Identification of Quinidine. S. Vreven. (*Chemist and Druggist*, lii. 400, from *Chem. Zeitung*.) Quinidine can be distinguished from other cinchona alkaloids by the shape of the crystals formed by Marmé's reagent (potassio-cadmium iodide) in a solution of the alkaloid or its salts. Under the microscope the precipitate thus formed is found to consist of tufts of fine needle-shaped crystals, quite different to those obtained from quinine, cinchonine, and cinchonidine.

Tropine Derivatives. A. van Son. (*Pharm. Journ.*, from *Archiv der Pharm.*, ccxxv. 685.) The author, in continuation of the work of E. Schmidt and his pupils on tropine, has studied the action of monochloroacetic acid, ethylene chlorhydrin, and ethylene

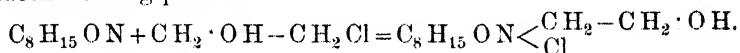
bromide on tropine, and finds that it behaves towards these bodies in a manner analogous to trimethylamine, pyridine and other simply constituted tertiary bases. Tropinebetaine chloride was obtained by the action of monochlor-acetic acid on tropine at 130° C., according to the equation—



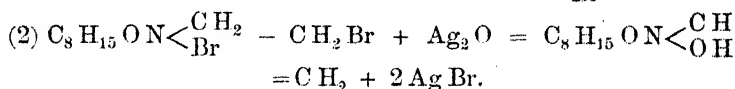
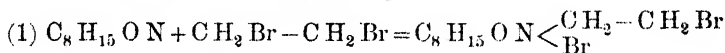
The gold salt, $C_8H_{15}ON < \begin{smallmatrix} CH_2 - CO \cdot OH \\ Cl, AuCl_3 + H_2O \end{smallmatrix}$, melts at 223-224°.

The platinum salt, $(C_8H_{15}ON < \begin{smallmatrix} CH_2 - CO \cdot OH \\ Cl \end{smallmatrix})_2 PtCl_4 + 2H_2O$,

melts at 227° C. Tropinecholine chloride was produced by heating tropine for three hours at 100° with ethylene chlorhydrin, the reaction taking place thus—



The gold salt and platinum salt were prepared. As the starting-point for the preparation of tropineneurine, the addition product of tropine with ethylene bromide was obtained, and this by digestion with silver oxide converted into tropineneurine thus—



E. Schmidt, Bode, and Nothnagel have shown that trimethylamine ethylene bromide is converted into choline by long heating on the water bath with aqueous silver nitrate. A similar reaction occurs with the addition product of tropine with ethylene bromide, although it takes nearly three weeks to eliminate the second atom of bromine and to leave tropinecholine nitrate. In what respect tropinebetaine, tropinecholine, tropineneurine, and the corresponding trimethylamine derivatives resemble in physiological action betaine, choline, and neurine, is left for further investigation.

Carpaine. J. J. L. van Rijn. (*Archiv der Pharm.*, ccxxxv. 332-342.) Several derivatives of carpaine, $C_{14}H_2NO_2$, the alkaloid of *Carica papaya*, are discussed in this paper, which also contains a crystallographic description of the base and its principal salts.

Dioscorine, the Alkaloid of Dioscorea Hirsuta. H. W. Schütte. (*Pharm. Zeitschr. für Russl.*, xxxvi. 379, and *Chem. Centr.*, 1897, ii. 130, 131.) The tubers of *Dioscorea hirsuta* were examined in

1889 by Boersma, who then isolated two toxic alkaloids which he described under the names of dioscorine and dioscorecine. The author of the present paper finds that these two substances are identical and that *dioscorine* is the only toxic base occurring in the tubers of this plant. Its physiological effects are similar to those of picrotoxin, but much weaker. It is extracted from the drug by means of alcoholic hydrochloric acid; the solution thus obtained is rendered alkaline, repeatedly shaken with chloroform, the chloroform solution evaporated, the residual alkaloid converted into the hydrochloride, and the latter purified by re-crystallisation from alcohol. The base liberated from the purified salt crystallises in yellowish green plates, has a bitter taste, melts at 43.5°C ., is very hygroscopic, and easily soluble in water, alcohol, acetone, and chloroform, slightly in ether and benzene, and very slightly in light petroleum; it is a strong base, and slightly volatile in steam. With sulphuric acid and potassium iodate, it gives a brownish-yellow coloration which rapidly becomes bluish-violet; with sodium nitroprusside and an alkali, a reddish-violet coloration; and on warming with sulphuric acid, a reddish-violet. With mercuric chloride solution, it gives a white, amorphous precipitate, and with picric acid a yellow precipitate which melts at 184° ; with a solution of iodine in potassium iodide, it forms a white, amorphous precipitate, and with Bouchardat's reagent a brown precipitate, which gradually disappears. Phosphotungstic acid gives a white precipitate; phosphomolybdic acid, a yellowish-white; potassium cadmium iodide, a white; potassium bismuth iodide, a red, and bromine water a transient, yellow precipitate. The *hydrochloride*, $\text{C}_{13}\text{H}_{19}\text{NO}_2 \cdot \text{HCl} + 2\text{H}_2\text{O}$, crystallises from absolute alcohol in needles or plates, is very easily soluble in water, and has a specific rotatory power $[\alpha]_D = +4^{\circ} 40'$; the refractive index of a solution of 1.75 grammes in 100 grammes of water $n_D = 1.33776$. It loses its water of crystallisation at 100° , and the anhydrous salt melts at 204° . The *platinochloride* crystallises with $3\text{H}_2\text{O}$ in orange-yellow plates, and the anhydrous salt melts and intumesces at $199\text{--}200^{\circ}$. The *aurochloride* crystallises with $\frac{1}{2}\text{H}_2\text{O}$ in yellow needles, the anhydrous salt melting at 171° .

Alkaloids of Lupin Seeds. E. Schmidt. (*Archiv der Pharm.*, ccxxxv. 192-198.) From the seeds of *Lupinus luteus* and *L. niger*, the author has obtained lupinine, $\text{C}_{21}\text{H}_{40}\text{N}_2\text{O}_2$, and lupinidine, $\text{C}_8\text{H}_{15}\text{N}$. The seeds of *L. perennis* contain dextrolupanine and another alkaloid not yet identified. A *resumé* of previous investigations is given in this paper.

The Alkaloids of *Lycoris Radiata*. M. Morishima. (*Chem. Zeit. Rept.*, xxii. 13. From *Pharm. Journ.*) The author has isolated two alkaloids from *Lycoris radiata*—lycorine, precipitated by sodium carbonate from sulphuric acid solution, and sekisanine. Lycorine, $C_{33}H_{32}N_2O_8$, forms large colourless polyhedral crystals, which turn yellow at $235^\circ C.$, and decompose at $250^\circ C.$ to a deep-brown resinous mass; they are barely soluble in water, sparingly so in ether, alcohol, and chloroform. The solutions in acids give precipitates with the usual alkaloidal reagents. The gold salt is easily decomposed, and the platinum salt melts at 210° . $K_2Mn_2O_8$ in neutral solution furnishes a brown precipitate, which is dissolved with a fine fluorescence by an excess of hydrochloric acid. The fluorescence is also produced by dilute bromine water. The hydrochloride, $C_{33}H_{32}N_2O_8 \cdot 2HCl + 2H_2O$, crystallised from hot water in colourless bitter shining needles, melting at $208^\circ C.$ It produces general paralysis on frogs, and death through paralysis of the heart muscle; on warm-blooded animals it gives rise to vomiting, diarrhoea, and finally collapse. No special influence is apparent on the arterial or respiratory organs. Subcutaneous injections produce no irritation. Sekisanine, $C_{31}H_{34}N_2O_9$ or $C_{31}H_{36}N_2O_9$, crystallises from dilute alcohol in long colourless anhydrous columns, which are odourless and tasteless, melting at about $200^\circ C.$ It is scarcely soluble in boiling water, sparingly soluble in ether, chloroform and benzal, and readily in alcohol. It is only partially precipitated from acid solutions by sodium carbonate and alkaline solutions, being soluble in excess of the latter. The platinum salt melts at $194^\circ C.$ It gives no precipitates with the usual alkaloid reagents, and no fluorescence with bromine water, or $K_2Mn_2O_8$. Crystallised salts could not be obtained. Physiologically, it is quite inactive.

Yohimbine. H. Thoms. (*Amer. Journ. Pharm.*, 1897, 577.) The author confirms Spiegel's statement that yohimbo bark contains a powerful alkaloid, which he has isolated in a crystalline form, melting at $234^\circ C.$, and not 231° as stated by Spiegel. The yield was 0.54 per cent. He has found the alkaloid in the leaves of the tree as well as in the bark. It reacts with sulphuric acid and potassium bichromate like strychnine, which it may also resemble in physiological action. That point, however, remains to be determined.

Paucine. (*Pharm. Zeitschr. für Russland.* xxxvi, 295. From *Pharm. Journ.*) Paucine is the alkaloid of the nuts of *Pentaclethra macrophylla*, growing in the Congo States. It is obtained

by alcoholic extraction after distilling; the residue is subsequently extracted with petroleum ether, to separate the oil and the other components, the alkaloid dissolved out with dilute acids and liberated by an alkali. It crystallises in yellow foliaceous crystals which melt and decompose at 126° C. They have the formula $C_{27}H_{39}N_5O_5$, are soluble in soda solution, but not in ether or chloroform.

Ouabain. A. Arnaud. (*Comptes Rendus*, cxxvi. 346-349. From *Journ. Chem. Soc.*) Ouabain, when crystallised from aqueous solutions, can form three different hydrates, according to the temperature at which crystallisation takes place. The hydrate, $C_{30}H_{46}O_{12} + 9H_2O$, forms between 10° and 20° , and crystallises in quadratic tables.

The hydrate that forms at about 30° contains $4H_2O$, and that which is formed at about 60° contains $3H_2O$. The rotatory power of ouabain in aqueous solution is $[\alpha]_D = -30.6^{\circ}$. 100 c.c. of water dissolve, at 8° , 0.66 gramme of ouabain; at 14.5° , 0.93 gramme; and at 30° , 1.57 grammes. Cryometric observations with aqueous and acetic acid solutions confirm the molecular weight previously attributed to the compound.

When hydrolysed with dilute acids, ouabain yields rhamnose and a red resin, which is doubtless a product of the polymerisation of the second product of the hydrolysis. Each molecule of ouabain yields one molecule of rhamnose. Emulsin, diastase and other soluble ferments have no action on ouabain, but certain microbes seem to be able to split it up into rhamnose and a crystalline product.

Concentrated nitric acid converts ouabain into amorphous nitro-derivatives, large quantities of oxalic acid being formed if the liquid is heated. Dilute nitric acid yields crystallisable nitro-derivatives, which seem to be acidic in character, and are probably derived from the second product of hydrolysis. Bromine yields an amorphous derivative containing nearly 63 per cent. of the halogen. Alkalies form, with ouabain, compounds which are extremely soluble and are not crystallisable. Sodium and potassium in presence of alcohol yield compounds which seem to be of the type $C_{30}H_{45}MO_{12}$, and with an excess of the metals more hydrogen is displaced. Acetic anhydride between 30° and 70° yields an acetin, $C_{30}H_{39}O_{12}Ac_7$, which crystallises in micaceous lamellæ melting at $270-275^{\circ}$.

Oxycannabin, a Product from Indian Hemp. W. R. Dunstan and T. A. Henry. (*Proc. Chem. Soc.*, 1898, No. 189.) By oxidis-

ing extract of Indian hemp with nitric acid a substance is obtained crystallising in yellow needles, to which Bolas and Francis have ascribed the formula $C_{20}H_{20}N_2O_7$. The authors find the composition to agree with the formula $C_{10}H_{10}NO_4$. This substance appears to be derived from cannabinol, since it can be obtained by direct oxidation from the latter.

Oxysantonin. K. Jaffé. (*Pharm. Centralhalle*, xxxviii. 351. From *Pharm. Journ.*) Santogenin, obtained from dogs and rabbits treated with santonin, was found, on repeated crystallisation from alcohol, to yield a compound of the formula $C_{15}H_{18}O_4$, which the author describes as α -oxysantonin. This is very difficult to dissolve in boiling alcohol or in chloroform, and is almost insoluble in ether. Continual boiling with water dissolves small particles, which separate again almost completely on cooling. The solution is neutral. The compound is readily soluble in hot acetic acid; sparingly so in cold. It is slowly dissolved on being heated with diluted alkalies and alkaline earths. α -Oxysantonin crystallises from alcohol and chloroform in colourless, transparent, irregularly fringed tablets, from acetic acid in shining leaves, from alkaline solution, on the addition of acids, in fine needles. The author also isolated from the ether extract of the urine of the rabbit β -oxysantonin. The oxysantonin obtained from *Artemisia maritima* is considered to be a third isomer, and may be described as γ -oxysantonin.

Constituents of Lichens. O. Hesse. (*Ber. der deutsch. chem. Ges.*, xxx. 1983-1989, and xxxi. 663-665. From *Journ. Chem. Soc.*) Compare abstract *Year-Book of Pharmacy*, 1897, 77, where for *Candelaria concolor* read *Xantharia candelaria*. *Candelaria concolor* contains no calycin, but only dipulvic acid. Nor is calycin contained in *Gasparrinia medians* (*Physcia medians*, *Amphitoma medians*); the compound contained in these lichens resembles rhizocarpic acid, but is distinct from that substance.

The lichen collected from the bark of the American *Calisaya*, and which contains atranorin ("parmelin") together with a very little vulpic acid, certainly was *Parmelia perlata*; specimens collected at Feuerbach, it is true, contained neither vulpic nor usnic acids. Atranorin further occurs with capraric, physodic, and an amorphous acid in *Parmelia physodes* (*P. ceratophylla*), and with vulpic acid in *Evernia vulpina*; in *E. furfuracea* and *P. stellaris* var. *adscendens* it occurs alone.

Caperin and caperidin occur in *P. caperata* collected from the bark of oaks, but not in samples collected from fruit trees or

granite rocks. This lichen also contains, in addition to usnic and caperatic acids, *capraric acid*, $C_{24}H_{20}O_{12}$, which crystallises in white needles that darken at $240-260^{\circ}$ and has a bitter taste.

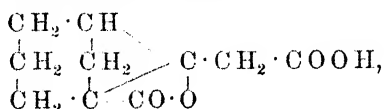
The two compounds obtained by Zopf from *P. ceratophylla* (*P. physodes*), in addition to atranorin, were probably capraric and physodic acids. Physodic acid, $C_{20}H_{22}O_6$, crystallises in white needles, and melts and decomposes at $190-192^{\circ}$.

Nephromium lusitanicum does not contain emodin, but a yellowish-brown crystalline substance, $C_{16}H_{12}O_6$, melting at 195° , to which the name *nephromin* is given. Presumably, it stands in the same relation to physcion as does emodin to chrysophanic acid.

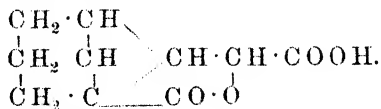
The chemical nature of some of the compounds named, as well as some of their derivatives, are also discussed in this paper.

Rhizocarpic acid has the formula $C_{28}H_{22}O_7$, and can readily be separated from parellic acid and rhizonic acid which accompany it in *Rhizocarpon geographicum f. contiguum*. *Rhizonic acid*, $C_{19}H_{20}O_7$, forms prisms which are almost cubical, and melts and decomposes at 185° .

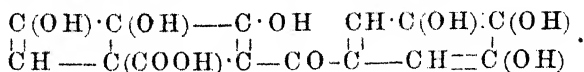
Constitution of Cantharidin. H. Meyer. (*Monatshefte*, xviii. 393-410.) The author arrives at the conclusion that cantharidin is probably represented by the formula—



and the isomeric monobasic cantharic acid by the formula—



Constitution of Tannic Acid. H. Schiff. (*Gazz. chim. Ital.*, 1897, xxvii. 1, 90-96. From *Journ. Chem. Soc.*) The author having shown that the natural tannic acid is dextrorotatory, suggested for it the following constitution, which contains six hydroxyl groups and an asymmetric carbon atom—



On acetylating the acid by various methods, a dextrorotatory *pentacetyl-tannic acid* is obtained which is insoluble in water, and has about the same specific rotation as natural tannic acid; the

compositions of the cupric, ammoniocupric, lead, and mercuramine salts also point to the existence of only five hydroxyl groups in tannic acid.

Gallic acid gives a good yield of rufigallol when heated with concentrated sulphuric acid at 100° , and if the ketonic nature of tannic acid as expressed by the above constitution is correct, the latter acid should yield rufigallol with even greater readiness. On heating tannic acid with concentrated sulphuric acid at 100° , however, carbonisation occurs and sulphurous anhydride is evolved; a little rufigallol is indeed formed, but only from the gallic acid into which the tannic acid is partially converted. Tannic acid gives no hydrazone, but only a resinous substance when treated with phenylhydrazine under various conditions.

The author was unable to synthesize tannic acid by B. Hunt's method of heating bromoprotocatechuic acid with potassium gallate and a little alcohol or water at $100\text{--}105^{\circ}$; this synthesis, therefore, cannot be used in support of the older formula for tannic acid which contains no asymmetric carbon atom.

Caffetannic Acid. P. Cazeneuve and E. Haddon. (*Comptes Rendus*, cxxiv. 1458-1460.) The authors have investigated the behaviour of caffetannic acid towards phenylhydrazine, and arrive at the conclusion that the composition of this substance is not $C_{15}H_{18}O_8$, but $C_{21}H_{28}O_{14}$. They ascribe to it the constitutional formula $COOH \cdot CH \cdot CH \cdot C_6H_3(O \cdot C_6H_{11}O_5)_2$, according to which it consists of one molecule of caffeic acid with two molecules of a sugar in the form of a saccharine di-ester.

The sugar, $C_6H_{12}O_6$, obtained in the hydrolysis of caffetannic acid, is still under investigation.

Products of the Action of Formaldehyde on Gallic Acid. R. Möhlau and L. Kahl. (*Ber. der deutsch. chem. Ges.*, xxxi. 259-266.) The author has investigated the action of formaldehyde on gallic acid, and describes the following products: a sparingly soluble crystalline methylenedigallic acid; a readily soluble crystalline methylenedigallic acid; a readily soluble amorphous methylenedigallic acid; and a sparingly soluble amorphous methylenegallic acid. The first and second of these four substances are readily convertible into the third, and the latter in its turn into the fourth. For details as to their characters and mode of preparation, the original paper should be referred to.

Conversion of Eugenol into Isoeugenol. C. Gassmann. (*Comptes Rendus*, cxxiv. 38-40.) The sodium derivatives of ethylic, butylic, and amylalcohols behave in a similar manner to the

caustic alkalies in transforming eugenol into isoegenol. With the ethoxide in alcoholic solution, it is necessary to boil for a long time, and even then the change is incomplete. The best results are obtained with sodium amyloxyde in the presence of amylic alcohol, from which solvent the pure isoegenol, boiling at 260–262°, can readily be separated by fractional distillation. The same method may be employed for the conversion of safrole into isosafrole.

Rhodinol. H. and E. Erdmann and P. Huth. (*Journ. prakt. Chem.*, lvi. 1–47; *Journ. Chem. Soc.*, January, 1898, 35–37.) *Pure rhodinol*, $C_{10}H_{17}OH$, was prepared from silver rhodinylic phthalate, itself obtained from commercial geraniol, by treating it with sodium chloride, hydrolysing the resulting sodium salt with alkali, and distilling over the rhodinol with steam; if it is prepared by the hydrolysis of the diphenylurethane, it is difficult to free it from diphenylamine. It boils at 110·5–111° under 16 mm. pressure, and can be boiled under atmospheric pressure, but then undergoes a certain amount of decomposition; it has a sp. gr. 0·8812; and a pleasant odour of roses. If a drop is diluted with 5 c.c. of alcohol in a porcelain basin, and 10 drops of strong sulphuric acid added, the latter becomes orange-yellow; when the basin is gently swayed, this colour changes to reddish-violet at the surface of separation between the two liquids, and disappears entirely as the liquids mix completely. This may be used as a qualitative test for rhodinol, although both linalool and citronellol give somewhat similar colorations.

Occurrence and Detection of Rhodinol in Etheral Oils.—The possible presence of rhodinol is first recognised by the sulphuric acid test. The oil (1 gramme) is then heated in a test tube with diphenylcarbamic chloride (1·5 grammes) and pyridine (1·35 grammes) for 2 hours at 100°, and the product is distilled with steam until a litre of distillate has collected, diphenylamine, derived from unchanged carbamic chloride, passing over. The residue, which solidifies on cooling, is recrystallised from 30 times its weight of alcohol; the yield of solid crystalline product is much reduced if citronellol is present, as this forms a liquid urethane. In this way, samples of oil of roses from Turkey and Germany were examined; of geranium oil from France, Bourbon (Réunion) and Syria; oil of ginger-grass; of citronella; of palmarosa from Turkey, and of neroli, both “bigarade” and from Portugal. The results varied extremely. Turkish oil of roses gave the greatest, the samples of oil of neroli the smallest, yield of crystalline diphenylurethane. Geraniol can be freed by Monnet’s method from non-

alcoholic constituents; it is heated with acetic anhydride at 140° for 8 hours, the acetates are purified and then hydrolysed with alcoholic potash, and the oil thus obtained is distilled under diminished pressure. Rhodinol is the chief constituent; a sample from Schimmel of Leipzig was found to owe its less pleasant odour to the presence of chlorine compounds, so that commercial geraniol stands in much the same relation to pure rhodinol as does synthetic benzaldehyde to oil of bitter almonds. Commercial rhodinol from the Société Chimique des Usines du Rhône at Lyon yielded a rhodinol identical with that obtained from geraniol; the heat of combustion is 3026 Cal. in both cases. Mixed with the rhodinol is citronellol, $C_{10}H_{19}\cdot OH$, which was isolated and converted into derivatives. *Citronellylic hydrogen phthalate* resembles the rhodinylic compound, but is more stable; the *silver* salt melts at $120-124^{\circ}$; the liquid *methylic* salt was also prepared, and so was liquid *citronellylic diphenylurethane*.

The authors consider that the name *geraniol* ought to be abandoned, this substance being identical with rhodinol.

Rhodinol. J. Bertram and E. Gildemeister. (*Journ. prakt. Chem.*, lvi. 506.) In reply to H. Erdmann (preceding abstract), the authors give their reasons for regarding "*geraniol*" as preferable to "*rhodinol*" as a name for the alcohol $C_{10}H_{18}O$, common to oil of rose and oil of geranium.

Rhodinol. T. Poleck. (*Journ. prakt. Chem.*, lvi. 515, and *Ber. der deutsch. chem. Ges.*, xxxi. 29.) The author advocates the use of the name "*rhodinol*" as preferable to "*geraniol*" for the constituent $C_{10}H_{18}O$ occurring in oil of rose and also in oil of geranium. He protests, however, against the application of this name for *l*-citronellol, $C_{10}H_{20}O$, for which it has recently been used by Tiemann and Schmidt.

Anethol and its Isomers. (*Amer. Chem. Journ.*, xix. 845. From *Pharm. Journ.*) The researches of Orndorff, Terrasse, and Morton may be summarised as follow:—Methylchavicol of Eykman and estragol of Grimaux have the same molecular weight and are metameric forms of anethol. From the results obtained by various investigators it must be concluded that they are identical. Fluid metanethol has the same molecular weight as anethol, and is a metamer of this substance. From its chemical behaviour and its physical properties it must be a stereoisomer of anethol, and it is

probably
$$\begin{array}{c} HCC_6H_4OCH_3(p) \\ || \\ CH_3CH \end{array}$$
 Anisoin, a resinous polymeric modifi-

cation of anethol, which acts as a colloid towards the solvents, acetic ether, acetone, benzol, etc. Solid metanethol and the fluid isoanethol have both the same molecular weight and are polymers of anethol. As their molecular weight is twice that of anethol, it is proposed to call them solid and liquid dianethol respectively; as both act like saturated compounds they may possibly be derivatives of tetramethylene. Anethol, heated under pressure to 250-275° C., is converted into isoanethol, the methyl ester of paracresol

$C_6H_4 < \begin{smallmatrix} OCH_3 \\ CH_3(p) \end{smallmatrix}$, and the methyl ester of parapropylphenol,

$C_6H_4 < \begin{smallmatrix} OCH_3 \\ C_3H_7(p) \end{smallmatrix}$. Under these conditions there is apparently a

tendency to form saturated compounds.

Mentho-Glycol from Citronellal. P. Barbier and M. Leser. (*Pharm. Journ.*, from *Comptes Rendus*, cxxiv. 1308.) When pure citronellal is agitated for six hours with ten times its weight of 5 per cent. sulphuric acid, the aldehyde becomes viscous and develops a strong minty odour. From this three definite bodies have been isolated by the authors. The first, boiling at 88-89° C. under pressure of 10 mm., proved to be isopulegol. The second fraction, distilling at the same pressure between 144-145° C., was a viscous, almost colourless fluid, which on cooling solidified to a crystalline mass. The purified crystals melted at 81-81.5° C., and had the formula $C_{10}H_{20}O_2$. Treated with acetic anhydride at 100° it gave the acetic ester $C_{10}H_{19}O(C_2H_3O_2)$; but when heated to 150° C. with acetic anhydride and anhydrous sodium acetate, the body $C_{10}H_{17}(OC_2H_3O)$ was formed. Hydrochloric acid gas, passed into a solution of the substance in glacial acetic acid, gave the compound $C_{10}H_{18}Cl(OC_2H_3O)$. The body $C_{10}H_{20}O_2$ is regarded as a glycol, and has been called mentho-glycol. This has been confirmed by its reproduction from isopulegol by the introduction of a molecule of water. By the abstraction of a molecule of water, mentho-glycol is reconverted into isopulegol. The third substance obtained was a small quantity of a body boiling at 185° C. (10 mm.), and had the composition $C_{20}H_{34}O$. It is considered to be a condensation product of two molecules of citronellal with the elimination of a molecule of water.

Dicamphor and Dicamphenedion. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 827.) By allowing sodium to act upon a toluol solution of bromocamphor at about 90° C., dicamphor ($C_{10}H_{15}O_2$), and dicamphenedion ($C_{10}H_{14}O_2$), are formed, which may be separated by crystallisation from dilute alcohol, and subsequently from

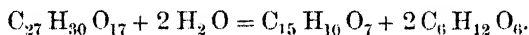
ligroin. Dicumphor crystallises in colourless needles melting at 165–166° C., while dicamphenedion forms yellow prismatic needles which melt at 192–193° C. With hydrazine hydrochloride in acetic acid solution, these two compounds form respectively dicamphanepyridazine, $(C_{10}H_{15})_2N_2$, and dicamphenepyridazine, $(C_{10}H_{14})_2N_2$.

These new substances are intended to be introduced as therapeutic agents, and are reported upon by Meister, Lucius, and Brüning.

Note on Carotin. A. Hilger. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 691.) Carotin, the yellow colouring matter contained in the flowers of *Calendula officinalis* and in numerous other plants, can be readily purified by repeated re-crystallisation from alcohol. The author has previously shown it to be a mixture of cholesterin esters; the principal fatty acids contained in it are myristic, palmitic, stearic, and lauric acids. Carotin is slowly decomposed on fusion with caustic potash, its gradual decomposition being indicated by changes in its characteristic absorption bands during this treatment.

In the synthetic preparation of propionic cholesterin ester, a yellow product is obtained, which has not yet been further investigated.

Some Vegetable Yellow Colouring Matters. A. G. Perkin. (*Proc. Chem. Soc.*, 1897, No. 183.) Cape sumach, the leaves of the *Colpoon compressum*, is used in South Africa as a substitute for sumach (*Rhus Coriaria*) under the name of "Pruim-bast." According to H. Proctor it contains 23 per cent. of a catechol tannin. Its dyeing property is due to the presence of a new glucoside, *osyritrin*, $C_{27}H_{30}O_{17}$, pale yellow needles, m.p. 185°, which is decomposed by acid into quercetin and glucose,

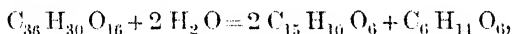


This is not identical with viola-quercetrin, $C_{42}H_{42}O_{24}$, which exists in the *Viola tricolor florensis*. The tannin, obtained as an orange-coloured, transparent mass, is a glucoside yielding, with acid, an anhydride or phlobophane and a sugar. By fusion with alkali, protocatechuic acid is formed. A re-examination of gambir catechu (*Uncaria Gambir*) corroborated the statement of Löwe (*Zeit. anal. Chem.*, 1874, 12, 127) that this contains quercetin. Acacia catechu not previously examined was found to contain the same colouring matter,

The dyeing properties of a commercial sample of Venetian sumach (*R. Cotinus*) are due to myricetin and not quercetin as stated by Löwe. This result will be corroborated by the examination of a specially picked sample.

Valonia (*Quercus Aegilops*), divi-divi (*Casalpina Coriaria*), myrabolans (*Terminalia chebula*), agarobilla (*Casalpina brevifolia*), pomegranate rind (*Punica granatum*), and gall-nuts (*Quercus infectoria*), owe their tinctorial property to ellagic acid, and contain no member of the quercetin group. It is here pointed out that the plants examined hitherto contain, respectively, a tannin and colouring matter which yield on decomposition identical acids, and in some cases the same phenol.

Rhus rhodanthema, a tree growing to the height of 70 or 80 feet, is indigenous to northern New South Wales. The colouring matter $C_{15}H_{10}O_6$ is identical with fisetin. A glucoside of fisetin, $C_{36}H_{30}O_{16}$ ($C=60.18$; $H=4.45$), colourless needles, m.p. $215-217^\circ$, is also present; it is decomposed with difficulty by boiling dilute acids. This closely resembles fastin, $C_{58}H_{46}O_{23}$ or $C_{36}H_{26}O_{14}$ ($C=63.34$; $H=3.81$), m.p. $217-219^\circ$, the fisetin glucoside of *R. Cotinus* (Schmid, *Ber.*, 1886, 19, 1753), but differs from it in percentage composition. Its decomposition with acid would be closely expressed by the equation—



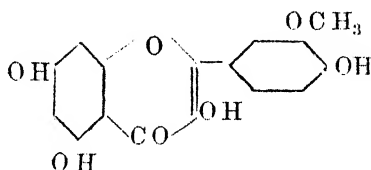
if rhamnose or glucose are liberated by this reaction. Gallic acid was also isolated, evidently as a decomposition product of gallo-tannic acid contained in the wood.

Berberis ortuensis, a plant resembling *Berberis vulgaris*, flourishes in Cyprus. It was found to contain berberine, but no colouring matter of the mordant yellow class.

The perianths surrounding the seeds of *Rumex obtusifolius* contain a trace of quercetin, which is interesting, as in many roots of this species methylantraquinone derivatives also exist. It is also pointed out that the leaves and green stems of the madder (*Rubia tinctoria*) contain a yellow colouring matter which will be examined.

Yellow Colouring Matters of Delphinium Zalil. A. G. Perkin and J. A. Pilgrim. (*Proc. Chem. Soc.*, 1898, No. 190.) "Asbarg" consists of the dried flowers and flowering stems of the *Delphinium zalil*, found in great quantity in Afghanistan, and which is much used in India for the production of a yellow colour on alum mordanted fabrics. The flowering stems are nearly devoid of dyeing

property. Three colouring matters exist in this plant in the form of glucosides. The sparingly soluble colouring matter, $C_{16}H_{12}O_7$, forms glistening yellow needles, soluble in alkalis with a yellow colour. Fused with alkali it yielded phloroglucinol and proto-catechuic acid, and by means of hydriodic acid it yielded quercetin with the evolution of 1 mol. of methylic iodide. By methylation it was converted into quercetintetramethyl ether, and by acetylation into a tetracetyl derivative of the formula $C_{16}H_8O_7(C_2H_3O)_4$, colourless needles, m.p. $195-196^\circ$. It was evidently *isorhamnetin*, a quercetinmonomethyl ether, recently isolated from the yellow wallflower, *Cheiranthus Cheiri*. As by oxidation in alkaline solution this yields vanillic acid, it has most probably the constitution represented by the following formula:—



With alumina as mordant it dyes a purer yellow than quercetin. The chief constituent of the more soluble portion was recognised to be identical with *quercetin*, the colouring matter of quercitron bark. The residual colouring matter, present only in small quantity, was not obtained in a pure condition. It resembled quercetin in percentage composition, and in its decomposition products, but differed from it in not reacting with alcoholic potassium acetate, and the melting point of its acetyl derivative. "Asbarg" resembles quercitron bark in dyeing property, but has only 35 per cent. of the tinctorial power of this dyestuff. It contains, when freed from the flowering stalks, 3.47 per cent. of colouring matter (not as glucoside).

Yellow Colouring Matters of Various Adulterants of Sicilian Sumach. A. G. Perkin and P. J. Wood. (*Proc. Chem. Soc.*, 1898, No. 193.) This paper describes an investigation of the leaves of those plants which are employed for the adulteration of Sicilian sumach (*Rhus coriaria*).

The leaves of *Pistacia lentiscus* (shinia) contain a colouring matter of the formula $C_{15}H_{10}O_8$, forming an acetyl compound, $C_{15}H_4O_8Ac_6$, crystallising in colourless needles (m.p. $204-206^\circ$). As on decomposition this yields gallic acid and phloroglucinol, it is identical with myricetin, the colouring matter of *Rhus coriaria*.

Two tannins appear to be present : one dissolves in ethylic acetate, yields gallic acid on decomposition, and is evidently gallotannic acid ; the other is insoluble, and forms acetic acid, phloroglucinal, and gallic acid on fusion with alkali. When digested with dilute sulphuric acid, the latter yields a red product resembling the anhydrides of the catechol tannins. The further examination of this tannin is reserved. *Shinia* leaves contain 11·3 per cent. of tannin, and appear to be a useful tanning agent, though not suitable for the same purposes as sumach.

The leaves and stems of *Tamaris gallica* and *T. africana* (brucea) contain the same colouring matter. It has the formula $C_{16}H_{12}O_7$, and forms an acetyl compound (m.p. 169–171°). Decomposition with alkali gave phloroglucinol and protocatechuic acid, and with hydriodic acid quercetin and a molecular proportion of methylic iodide were formed. This substance appears to be a new *methyl ether of quercetin*, distinguished from rhamnetin and isorhamnetin by its ready solubility in alcohol. So little of it was available for examination that its absolute purity could not be guaranteed. The tannin (8·4 per cent.) is evidently a mixture of ellagitannin and gallotannin, for both ellagic and gallic acids were isolated as its decomposition products.

The leaves of *Ailantus glandulosa* contain quercetin. The tannin present (11·9 per cent.) is a mixture of ellagitannin and gallotannin, for both ellagic and gallic acids were isolated. This is a worthless tanning agent : the skin, though stained a deep colour, is practically untanned.

The colouring matter of the leaves of *Ficus carica*, the common fig-tree, though resembling quercetin, could not be identified, as from 2 kilos. only 0·08 gramme of the substance was obtained. It is nearly devoid of tannin (analysis gave 1·6 per cent.), skin being untanned, though stained a dirty olive colour.

Gambuzzo, the stalks of the *Rhus coriaria*, contain a trace of myricetin and some gallotannic acid.

Broach leaves are employed in South Africa in place of sumach (*R. coriaria*); and are also replacing Cape sumach (*Colpoon compressum*). They contain 19·9 per cent. of a catechol tannin, and they form a valuable tanning agent. The colouring matter, having the formula $C_{15}H_{10}O_7$, forms an acetyl compound, m.p. 188–190°, and on decomposition yields phloroglucinol and protocatechuic acid. It differs from quercetin in its reaction with dilute alkali forming deep green solutions, and appears to be identical with the colouring matter of *Arctostaphylos uva ursi*.

The galls of *Pistacia terebinthus* contain a trace of myricetin, whereas Mangrove cutch (*Cerriops candolleana*) is devoid of yellow colouring matter.

Coleopterin. A. B. Griffiths. (*Comptes Rendus*, cxxiv. 1461. From *Pharm. Journ.*) By extracting the elytra of the ladybird, *Coccinella septempunctata*, and those of *Pyrochroa coccinea* and *Lina populi* with boiling ether and alcohol, and purifying by re-solution in alcohol, and subsequent evaporation to dryness, the author has obtained an amorphous red pigment, corresponding to the formula $C_7H_5NO_5$. It is soluble in alcohol, ether, carbon bisulphide, and acetic acid. As isolated by solvents, it is decolorised by light, and its solutions give no characteristic absorption bands. It appears to be a lutein or lipochrome.

Phallin. R. Kobert. (*Pharm. Journ.*, 4th series, vi. 385. From *Trans. Brit. Mycol. Soc.*) The author applies the term phallin to the poisonous substance present in *Amanita phalloides*. It is a tox-albumin, and causes, when present even in very minute quantities, dissolution of the red corpuscles of the blood, followed by the liberation of certain ferments. The same substance has been detected also in other species of the same genus, viz., in *Amanita virescens*, *viridis*, *citrina*, *virosa*, *nappa*, *recutita*, and *porphyria*.

Proteids of Maize. T. B. Osborne. (*Journ. Amer. Chem. Soc.*, xix. 525. From *Pharm. Journ.*) The author records the results of some additional researches on the maize proteids. These bodies are distinguished according to their solubilities: (a) proteid, soluble in pure water, having some of the properties of proteose; (b) globulins, insoluble in pure water, but soluble in salt solutions; (c) proteid, insoluble in water and salt solutions, but soluble in alcohol of 60 to 99 per cent.; (d) proteid matter, insoluble in water, salt solutions, and alcohol, but soluble in dilute alkalies and acids. The results of the examination of these groups are now published. It seems quite certain that no true albumin exists in the maize kernel; the globulin formerly designated "maize myosin" is now termed "maysin," another which seems to be identical with the "albumin" formerly obtained by precipitation is referred to as "maize globulin," and a third, formerly designated "maize vitellin," appears to be identical with edestin which has been found in various seeds. The proteid soluble in dilute alcohol consists of "zein," which dissolves abundantly in ethyl alcohol of sp. gr. 0.820, forming solutions which, on evaporation in thin layers, leave perfectly transparent sheets of the proteid. In absolute alcohol, as in water, zein is

wholly insoluble. It is freely soluble in concentrated glycerin, on heating to about 150°C ., also in crystallised phenol, glacial acetic acid, and caustic potash solution. The total quantity of soluble proteïds in 100 grammes of finely ground maize was found to be 8.5969 grammes, and deducting from this the sum of the several proteïds previously determined, viz., zein, 5 grammes, globulins, 0.39 gramme, and proteose, 0.06 gramme, there remains 3.1469 grammes of proteïd insoluble in salt solutions and alcohol, but soluble in dilute potash water. The mean percentage of nitrogen in maize proteïds is 16.057.

The Proteïds of the Pea and Lentil. T. B. Osborne and G. F. Campbell. (*Journ. Amer. Chem. Soc.*, xx, 348.) The authors publish further information respecting the proteïds of the pea. They find that the legumin of that seed, as formerly described by them, was contaminated with more or less vicilin, and that when the latter is completely separated, the legumin is identical in composition and reactions with that of the vetch. The pea is now shown to contain legumin, a globulin not coagulated by heating its solutions; vicilin, a globulin soluble in a more dilute brine than legumin and coagulated on heating its solutions to 95° to 100° ; legumelin, a proteïd partially precipitated by dialysis; a proto-protease and a deuteroprotease. The combined amounts of legumin and vicilin extracted was about 10 per cent., whilst the amount of legumelin obtained was slightly more than 2 per cent. The lentil was found to contain the same proteïds as the pea.

Cacao Butter as a Food. M. Bourrot and F. Jean. (*Comptes Rendus*, cxxiii, 587-590.) The authors' experiments show that cacao butter has a high nutritive value, and is readily digestible. Ordinary butter was digested to the extent of 95.8, and cacao butter to that of 98 per cent.; in both cases, therefore, a very small residue of fat was found in the fæces.

Function of Tannin in Fruits. C. Gerber. (*Comptes Rendus*, cxxiv, 1109.) The author arrives at the conclusion that the principal function of tannin in fruits is to prevent pectic transformations, and thus to check the fermentation of the sugars. The final disappearance of the tannin takes place by its complete oxidation, without the formation of carbohydrates.

Presence and Importance of Manganese in Laccase. G. Bertrand. (*Comptes Rendus*, cxxiv, 1032-1035.) Laccase (*Year-Book of Pharmacy*, 1896, 63, and 1897, 78) is shown by the author to contain small quantities of manganese, which seem also to occur in other oxidising ferments (oxydases). The presence of this metal

appears to have an important bearing on the action of these ferments, since the author's observations lead to the conclusion that the oxidising power of laccase varies with the proportion of manganese present.

Caroubinase, a New Hydrolytic Enzyme. J. Effront. (*Pharm. Journ.*, 4th series, v. 191, from *Comptes Rendus*.) The author has examined the seeds of *Ceratonia siliqua*, and has isolated a new zymase, *caroubinase*, which is developed during the germination of the seeds. This ferment acts energetically on caroubin, liquefying gelatinous solutions of that carbohydrate. It appears to be most active at between 40° C. and 50° C. It is destroyed at 80° C. A trace of formic acid increases its liquefying power. The liquid resulting from the action of the ferment on the caroubin jelly is rich in a reducing sugar which is precipitated by alcohol, and is soluble in water, the solution being strongly dextro-rotatory. Treated with dilute mineral acids, it gives a peculiar non-crystalline sugar, "caroubinose," the composition of which is represented by the formula $C_6H_{12}O_6$.

Betulase, an Enzyme contained in Betula Lenta. A. Schneegans. (*Chem. Centr.*, 1897, 326. From *Journ. Chem. Soc.*) Gaultherin, the glucoside present in the bark of *Betula lenta*, on hydrolysis yields a carbohydrate and methylic salicylate, and by macerating the powdered bark during four weeks with glycerin, the author has extracted an enzyme, *betulase*, capable of rapidly effecting the same change. On adding alcohol to its glycerin solution, betulase is precipitated as a greyish-white powder, the yield being about 0.1 per cent. of the weight of bark taken. The hydrolytic power of betulase is not affected by exposing it for a long period to the air, or by long drying in a desiccator, or even by heating it for several hours at 130°; on the other hand, an aqueous solution of the enzyme rapidly loses its hydrolytic power, especially on being heated. It cannot be dialysed, and becomes turbid when heated, or when a mineral acid is added to it. The hydrolytic power of betulase seems to be increased by the presence of small quantities of alkalis or mineral acids, but is diminished by the presence of tannic, picric, or tartaric acid, or of ferric chloride, mercurous nitrate or lead acetate. Mercuric chloride and the sulphates of copper, iron, and zinc are without action. An aqueous solution of betulase does not give a blue coloration with guaiacol, even in presence of hydrogen peroxide; it does not convert starch into sugar, or dissolve albumin or fibrin; neither does it hydrolyse amygdalin, phloridzin, nor salicin. Diastase, emulsin, papayotin

pepsin or ptyalin do not act on gaultherin. In *Betula lenta*, as in the bitter almond, a glucoside and an enzyme capable of hydrolysing it exist together.

Soluble Ferment in Wine. G. Tolomei. (*Journ. Chem. Soc.*, 1898, 247, 248.) The author confirms the presence in wine of a soluble oxidising ferment resembling Bertrand's laccase (see *Year-Book of Pharmacy*, 1897, 78). It is to the combined action of this ferment and of atmospheric oxygen that the oxidation and precipitation of the colouring matter in wines is due.

On adding a muscatel ferment to a sterilised wine must, the latter after a few days develops a crop of *Saccharomyces ellipsoideus*, which, when separated, sterilised, and exposed to the air, gives on extraction with chloroform water, Bertrand's reactions for laccase; similar results were obtained with *Saccharomyces cerevisæ* and *S. apiculatus*.

The author finds, moreover, that the enzyme may play a part in the maturing of wine. On adding the enzyme extracted from muscatel yeast to an ordinary white wine and exposing it to the air, the wine acquires a muscatel bouquet which it did not previously possess; this action was hastened by slightly ozonising the air in contact with the wine, and contrasts with the action of organised ferments in that it is greatly promoted by sunlight.

It is concluded that a soluble ferment is elaborated during the development of *Saccharomyces ellipsoideus*, which, remaining dissolved in the wine, is capable of producing all the modifications which constitute the maturing of wine.

The Oxydase of Grapes. A. Bouffard and L. Semichon. (*Comptes Rendus*, cxxvi. 423-426.) Attention has already been directed to the presence of an oxydase or oxidising ferment in grape juice and wine, and to its power of oxidising and precipitating the natural colouring matter. The author now shows that in the grapes this oxydase is located chiefly in the vascular tissue, and that by heavy crushing a sufficient quantity of it can be made to pass into the must to render it possible to prepare a white wine from purple grapes, if such must be exposed to the action of a plentiful current of air. This circumstance also indicates the necessity of avoiding heavy crushing in the preparation of red wines in order to guard against the loss of too much colouring matter.

Proteolytic Enzyme of Yeast Extract. M. Hahn. (*Ber. der deutsch. chem. Ges.*, xxxi. 200, 201.) The author has succeeded in demonstrating the presence in yeast extract, as obtained by Buch-

ner's method (abstract, *Year-Book of Pharmacy*, 1897, 78), of an enzyme which has the power of rendering albumin soluble. When a few c.c. of the yeast extract are mixed with a few drops of chloroform or any other antiseptic, and then added to solid phenol-gelatin contained in a test-tube, an appreciable amount of the gelatin dissolves in the course of twenty-four hours, and at the end of several days the whole mass has turned liquid. These results are in agreement with those obtained by Schützenberger and by Salkowski on autodigestion, and by Will on proteolytic enzymes in pure yeast cultures. The author shows that this enzyme can be extracted from different kinds of yeast, and finds himself unable to account for Neumeister's failure to obtain it. Similar solutions can also be obtained from the bacilli of tuberculosis and typhus, but their proteolytic action is less marked.

Proteolytic Enzyme of *Nepenthes*. S. H. Vines. (*Annals of Botany*, 1897, 563. From *Pharm. Journ.*) The nature of the fluid secreted in the pitchers of *Nepenthes* has been investigated by the author, the species chiefly examined being *N. mastersiana*. He has definitely determined that the digestive powers of this fluid are due to the action of a true proteolytic enzyme in the presence of an acid, and not merely to the presence of bacteria. The liquid will digest fibrin in the presence of 1 per cent. hydrocyanic acid; active glycerin extract can be prepared from the pitcher-tissue. The enzyme is clearly allied to the peptic group, and is apparently tryptic in its action. The proteid-product of digestion appears to be not peptone, but deutero-albumose. One peculiarity of the enzyme is its great stability; it is antiseptic and resists decomposition.

Distribution of Amygdalin and Emulsin in Seeds. M. L. Lutz (*L'Union Pharm.*, xxxviii. 197.) The author finds that amygdalin and emulsin exist together in the seeds of the genera *Malus*, *Cydonia*, and *Sorbus*, but do not occur in *Pyrus*, *Crataegus*, and *Mespilus*. Emulsin is confined to the cotyledons, while amygdalin is met with in all parts of the embryo.

Presence of Peptone in Almonds. E. Lempert. (*Pharm. Zeitschr. für Russl.*, 1897, 527, and *Pharm. Centrallh.*, xxxviii. 737. From *Pharm. Journ.*) Peptone has been repeatedly detected in several members of the vegetable kingdom. The various discoverers have not, however, been able to isolate pure peptone, but a mixture of peptone and albumose. Lupin seeds, for instance, showed after three days 0.2 per cent. of this mixture, determined by the colorimetric method. The author has used phospho-molybdic acid

for detecting peptone in sweet almonds. The almonds were extracted without heat, the albuminoids being precipitated with picric acid solution. The peptone mixture was thus obtained as a yellow mass, readily soluble in water, insoluble in ether or strong alcohol. The respective reactions had a positive result, the filtrate of the ammonium sulphate precipitate giving with tannin a voluminous precipitate revealing the presence of peptone, together with albumose. In spite of considerable loss the author obtained 0.25 per cent. of peptone mixture from almonds.

Formation of Antitoxins in Plants. H. A. Cummins. (*Proc. Asiatic Soc., Bengal*, 1897. From *Pharm. Journ.*) The author suggests that the principal purpose served by the formation of antitoxins (alkaloids and others) in plants is to protect them against the action of injurious bacteria in the soil. This is confirmed by the fact that the production of poisonous principles varies in the same species with the nature of the soil. Thus, *Cicuta cirosa* is said to be not poisonous in the neighbourhood of Edinburgh; while the sale of *Agaricus campestris* is forbidden in the markets of Italy because of its poisonous properties. The antiseptic principles appear usually to be produced as the result of irritation of the cells caused by the entrance of organisms (bacteria), which produce fermentation of the juices of the plant; the antitoxin then killing the invading organism.

Synthesis of Tyrosin. E. Erlenmeyer and J. T. Halsey. (*Ber. der deutsch. chem. Ges.*, xxx. 2981, 2982.) Parahydroxybenzaldehyde, when warmed on the water bath with hippuric acid in the presence of acetic anhydride and fused sodium acetate, yields a yellow *lactimide*, which, when hydrolysed with sodium hydrate, yields parahydroxy- α -benzamido-cinnamic acid: this, when reduced with sodium amalgam, gives benzoyltyrosin, and the latter, when heated in sealed tubes with fuming hydrochloric acid, yields tyrosin.

Biological Relation of Chlorophyll and Hæmoglobin. M. Nencki. (*Ber. der deutsch. chem. Ges.*, xxix. 2877.) Phylloporphyrin, $C_{16}H_{18}N_2O$, a substance obtained from chlorophyll, has been observed by E. Schunck and L. Marchlewski to be closely related to hæmatoporphyrin, $C_{16}H_{18}N_2O_3$, both in composition and spectroscopic properties (see *Year-Book of Pharmacy*, 1897, 67). It is now shown that a similar relationship exists between phyllo-taonin and hæmin.

New Bile Pigments. A. Dastre and N. Floresco. (*Comptes Rendus*, cxxv. 581-583. From *Journ. Chem. Soc.*) In addition

to bilirubin, which the authors call the original pigment, and biliverdin, which they call the definite or final pigment, the biles of many animals contain two others which they call *biliprasinic* or *intermediate pigments*. Biliprasinic-yellow exists in the bile of the calf and in other yellow biles; it is changed to green (biliprasinic-green) by the action of carbonic anhydride, glacial acetic acid, and other acids, especially in presence of alcohol, is unstable in a vacuum, and is decomposed by light. Biliprasinic-green exists in the fresh bile of the ox, the rabbit, and other animals. Alkalies convert it into biliprasinic-yellow, this being the alkaline pigment, whilst the green is the acid pigment. In a vacuum it changes into bilirubin. The characteristic difference between the biliprasinic pigments on the one hand, and bilirubin and biliverdin on the other, is that the biliprasinic acid is displaced from its combination with alkalies by carbonic anhydride, whilst bilirubin and biliverdin displace carbonic acid. All the pigments are derived from bilirubin by oxidation and hydration, and the biliprasinic acid is intermediate between it and biliverdin. The chief agents in bringing about these changes, except that of biliprasinic-yellow into biliprasinic-green or *vice versa*, are oxygen, which is indispensable, heat, light, and alkalies and acids. Marked alkalinity increases the stability of bilirubin, neutrality or acidity accelerates the formation of biliprasinic-green. Heat tends to change bilirubin into biliprasinic-green, and the latter into biliverdin, but prolonged heating at 100° decomposes the bilirubinate. Light rapidly converts bilirubin into biliprasin, and the latter into biliverdin. It is probable that the oxidation and hydration of bilirubin begins in the hepatic cellules and the biliary canaliculi; in all cases, these changes continue in the gall-bladder. The artificial conditions of the transformation are not realised in the animal body, and it is necessary to assume the existence of a particular oxidising agent, or a particular condition in the organism, occurring in the liver, and passing in part into the bile.

A New Reaction of Bile Pigments. A. Gluzinski. (*Wien. klin. Wochenschr.*, December 30th, 1897.) When a solution containing bile pigments is mixed with a few drops of formaldehyde and then boiled for a few minutes, an emerald green coloration is produced which changes to amethyst violet on the addition of hydrochloric acid. In order to apply this reaction for the detection of bile pigments in urine, equal quantities of the latter are placed in two separate test-tubes; one of these is mixed with formaldehyde and boiled for a few minutes, whereupon the presence of pig-

ment will be indicated by a green coloration. Half of this green solution is now transferred to a third test-tube, and mixed with a few drops of hydrochloric acid, which should change the colour to amethyst violet. The different colours are seen very distinctly on comparing the three test-tubes. This reaction is stated to be far more delicate than Gmelin's test. If the green liquid obtained on boiling with formaldehyde be shaken with chloroform, the green colour will pass into the latter; in the case of biliverdin, the chloroform layer will show a violet instead of a green colour. If a urine containing the colouring matter of blood be treated in the same manner, the chloroform layer will appear red.

Detection of Urobilin in Urine. G. Leo. (*Chem. Centr.*, 1897, 440.) The precipitate obtained on adding basic lead acetate to 150-200 c.c. of the sample, after being washed with water until practically free from soluble lead salts, and then with 8-10 c.c. of absolute alcohol, is treated with 10-12 c.c. of alcoholic ammonia (10 vols. of alcohol and 2 vols. of aqueous ammonia), the liquid being poured again and again through the filter. The ammoniacal solution is then concentrated on the water-bath and tested for urobilin with ammoniacal zinc chloride, which gives a fluorescent, green solution; sulphuric acid changes this to a reddish colour, if care is taken to avoid any rise of temperature. The colouring matter may be extracted by agitating the liquid with amyl alcohol.

Biliverdic Acid. W. Küster. (*Ber. der deutsch. chem. Ges.*, xxx. 1831-1835.) The substance described by the author under the name of *biliverdic acid* is an oxidation product of the colouring matter of bile, and is prepared from bilirubin, $C_{46}H_{18}N_2O_6$, in the following manner:—An acetic acid solution of the latter is treated gradually with a concentrated aqueous solution of sodium bichromate, the resulting compound is decomposed with sulphuric acid, the liberated acetic acid evaporated, and the residual liquid extracted with ether. The ethereal solution yields biliverdic acid in the form of yellowish crystals having the composition $C_8H_9NO_4$. The author inclines to the supposition that the nitrogen is present as a cyanogen group, and that in this case biliverdic acid may be closely related to hæmatic acid, the oxidation product of hæmatoporphyrin.

Method for the Analysis of Gall Stones. G. Denigès. (*Journ. de Pharm.* [6], vi. 71, 72.) A few grains of the powdered calculus are boiled for half a minute or longer with 2 c.c. of glacial acetic acid. Cholesterol may be tested for by placing a drop of the hot

solution on an object glass, allowing the acetic acid to evaporate spontaneously for a few minutes and then examining under the microscope. The drop is then completely evaporated at a gentle heat, immediately wetted with a drop of alcohol, which is likewise allowed to evaporate, and the crystals (rhombohedral plates), after being moistened with water, are examined under the microscope. If the amount of cholesterol present is large, the acetic acid solution, on cooling, will deposit slender, crystalline needles. The presence of cholesterol may be confirmed by Salkowski's colour reaction. Biliary pigments are often detected by the green colour of the acetic acid solution; if this solution is not green, then a small quantity is added to a drop of a 1 per cent. solution of sodium nitrite, a green colour passing through blue to violet indicates the presence of biliary colouring matters. Another test is to add a few drops of hydrogen peroxide to the acetic acid solution, when a permanent green coloration is produced. The remainder of the acetic acid solution is evaporated to dryness, and the residue boiled for several minutes with 2 c.c. of water and 2 drops of a 25 or 30 per cent. solution of normal potassium oxalate: after filtering and evaporating the filtrate to dryness, the cold residue is mixed with 1 c.c. of alcohol, 1 drop of a sugar solution, and 1 c.c. of sulphuric acid, according to Pettenkofer's reaction.

Cholesterol. C. Cloez. (*Comptes Rendus*, cxxiv. 864-866. From *Journ. Chem. Soc.*) When a solution of bromine in carbon bisulphide is gradually added to a solution of cholesterol in the same solvent, both being cooled to -15° , the liquid suddenly becomes filled with minute, acicular crystals, which redissolve as the addition of bromine is continued, the cholesterol being converted into the dibromide $C_{26}H_{44}OBr_2$. The crystalline precipitate is readily isolated, and has the empirical composition $C_{26}H_{44}OBr$, but it is really a molecular compound of cholesterol and its dibromide, $C_{26}H_{44}OBr_2$. $C_{26}H_{44}O$, and can be formed by mixing, at -15° , molecular proportions of its proximate constituents dissolved in carbon bisulphide. It melts and decomposes at 112° , is very soluble in chloroform, ether, and benzene, and also in carbon bisulphide except at low temperatures. It is only slightly soluble in alcohol at the ordinary temperature, but dissolves readily at 70° , and this fact can be utilised for purifying the compound. Attempts to separate the compound into its components by the action of various solvents gave negative results; it either remained unaltered, or was converted into resinous products, especially if heated.

Effect of Sterilization on the Constituents of Milk. A. Wroblewski. (*Oest. Chem. Zeit.*, i. 5.) Sterilization of milk causes the conversion of a very small proportion of the milk sugar into caramel, the formation of a minute quantity of lactic acid, a coagulation of albumin, and a slight alteration in the casein such as will render it more readily precipitable by acids. The author does not conclude, however, that the digestibility of milk is lessened by these changes.

Action of Hydrochloric Acid on Casein. T. Panzer. (*Zeitschr. für physiol. Chem.*, xxiv. 138-141.) Prolonged heating of casein with strong hydrochloric acid leads to the formation of considerable quantities of glutamic acid. Hence Cohn's statement, that this acid is only produced in small proportion in this process, does not appear to be correct.

Casein-Mercury. (*Chem. Zeitung*, 1897, 964.) If a neutral solution of casein-alkali and mercuric chloride is either precipitated with alcohol or simply evaporated, a mercury compound of casein is obtained which is soluble in alkalies, and differs in this respect from the compound of casein and mercuric oxide described by Millon and Commaille. This new compound forms a perfectly clear solution with a large quantity of water to which a trace of ammonia or sodium bicarbonate has been added. From such a solution the mercury is not precipitated by sulphuretted hydrogen or by ammonium sulphide.

This new compound is intended to be introduced as a therapeutic agent by Meister, Lucius and Brüning.

Preparation of a Carbohydrate from Egg-Albumin. J. G. Spenser. (*Zeitschr. physiol. Chem.*, xxiv. 354.) Both Schützenberger and Pavy have shown that a carbohydrate can be readily prepared from white of egg, and this observation is confirmed by the author of the present paper. At the same time it is pointed out that this carbohydrate originates from the ovo-mucoid, and that an egg-albumin free from that substance fails to yield any carbohydrate.

Iodalbumin. F. Hofmeister. (*Zeitschr. für physiol. Chem.*, xxiv. 159-172. From *Journ. Chem. Soc.*) When purified crystallised egg-albumin (20 grammes) is heated during 4 hours with a mixture of potassium iodide (10 grammes), potassium iodate (5 grammes) and concentrated sulphuric acid (4 c.c.) dissolved in 400 c.c. of water, *iodalbumin* is precipitated as a light-brown powder which is insoluble in water; it dissolves in alkalies, but separates as a white, gelatinous precipitate on adding dilute acids,

although soluble in excess. Iodalbunin, after being carefully purified by successive precipitations, contains 8.95 per cent. of iodine, none of which is removed by continued washing with water or aqueous potassium iodide. It resembles albumin in being precipitated by potassium ferrocyanide, and in giving the xanthoprotein and biuret reactions, and the sugar reaction in presence of α -naphthol (Molisch); it fails, however, to give Millon's or Adamkiewicz's reactions, and does not produce lead sulphide when boiled with alkaline lead oxide. From the latter fact, the author concludes that the sulphur exists in an oxidised (sulphonic) form in iodalbunin, and partly in the form of a mercaptan or sulphide in ordinary albumin.

On the ground of previous analyses, the author attributes to crystallised egg-albumin the composition $C_{239}H_{386}N_{58}S_2O_{78}$, whilst to iodalbunin the formula $C_{227}H_{370}I_1N_{58}S_2O_{75}$ is given. Its formation is explained by assuming that 4 atoms of hydrogen in albumin are displaced by iodine, whilst 3 atoms of oxygen are added in the oxidation of 1 atom of sulphur: 2 mols. of a carbohydrate, $C_6H_{12}O_6$, are eliminated from, and 6 mols. H_2O added to, the molecule of albumin. This view is supported by the fact that a considerable proportion of a carbohydrate yielding a crystalline osazone was formed in the preparation of iodalbunin, owing to the hydrolytic action of the sulphuric acid employed.

When iodalbunin is digested with pepsin, peptone is formed and iodine liberated; when administered to rabbits, alkaline iodides are found in the urine after a few hours, but no toxic effects are produced.

The Digestive Power of Pepsin in the Presence of Alcohol. C. Symes. (*Pharm. Journ.*, 4th series, v. 398, and *Chemist and Druggist*, li. 723.) The author's experiments show that alcohol decidedly lessens and retards the digestive power of pepsin, but that this fact in itself does not prove the unsuitability of wines or other alcoholic liquids as vehicles for the administration of this digestive ferment.

His experiments were conducted in glass bottles placed in a water bath kept at a uniform temperature of $100^\circ F.$ by means of a Reichart's thermo-regulator. The importance of adopting the same temperature on all occasions when conducting comparative experiments was rendered evident by increasing the temperature to $110^\circ F.$, when digestion was found to proceed much more vigorously than at $100^\circ F.$, all other conditions being equal. Still, the presence of alcohol had the same prejudicial effect in retarding

solution of the coagulated albumin used. If, however, the bottles were replaced by wetted animal membranes, the condition of things was materially altered. It was found that the alcohol present in the liquid through which the coagulated albumin was distributed soon began to diffuse through the wetted membrane, and that the pepsin commenced to act with the same energy as in those containers where no alcohol was present, so that at the end of two hours there was no considerable difference between the weight of undissolved albumin in each case. Hence an alcoholic liquid, such as wine, may be used in preparing a solution of pepsin for medicinal use, as such a preparation soon becomes active when taken into the stomach in the presence of suitable food. Rectified spirit may also be used as a preservative in making essence of rennet, because its excessive dilution and ready evaporation, when mixed with the proper quantity of milk and warmed, overcome any prejudicial effect the spirit may have on the peptic bodies present. Glycerin is an excellent solvent of pepsin, but unless it is used in sufficiently large quantity to render the solution distasteful to the patient it is not a good preservative. The author finds that a solution of freshly-prepared undried pepsin in dilute glycerin, to which 10 per cent. of rectified spirit is added, forms, when filtered, an excellent medicinal preparation, which may be flavoured to taste.

Peptic Digestion. W. Croner. (*Virchow's Archiv*, cl. 260-271. From *Journ. Chem. Soc.*) A number of experiments are recorded, the object of which is to discover the relationship between the amount of pepsin and hydrochloric acid which will produce the most efficient digestion of albumin. The amount of pepsin should be over 0.1 per cent., and of hydrochloric acid between 0.05 and 0.1 per cent.

Activity of Pancreatin. E. Choay. (*Journ. de Pharm.* [6], vii. 418. From *Pharm. Journ.*) The author finds that pancreatin prepared according to the official method of the "Codex" and evaporated at a maximum temperature of 45° C., is markedly inferior in saponifying power to the aqueous extract evaporated *in vacuo* at 38° C., although, if carefully prepared, the official preparation is equally active in proteolytic and in amylolytic power. The saponifying action was determined by the method of Henriot, which consists in allowing the ferment to act upon a solution of monobutyrim of known strength, and then titrating the butyric acid liberated. A commercial specimen of pancreatin examined at the same time was found to be very defective both in proteolytic

action, and in its hydrolysing action on starch, not exerting more than half the amylolytic action of the specimens prepared by the author.

Influence of Alcohol on Digestion. R. H. Chittenden, L. B. Mendel and H. C. Jackson. (*Amer. Journ. Physiol.*, 1898, 164-209. From *Journ. Chem. Soc.*) On the introduction of alcohol or alcoholic beverages into the mouth in dogs and men, the flow of saliva is transitorily increased; and on its introduction into the stomach, the gastric secretion is increased in quantity, acidity, and proteolytic activity. Alcoholic drinks retard the activity of digestive fluids, but in the living animal this is counterbalanced by the increased secretion of the juices mentioned, as well as by the rapid absorption of the alcohol given; experiments with test meals, with and without alcohol, gave practically the same results. There is little or no direct influence on pancreatic or intestinal juices.

Influence of Borax and Boric Acid on Nutrition. R. H. Chittenden and W. J. Gies. (*Amer. Journ. Physiol.*, 1898, 1-39. From *Journ. Chem. Soc.*) Doses of borax up to 5 grammes, even when continued for some time, have no effect on the nutritional changes of the body. Larger doses (5 to 10 grammes daily) increase proteid metabolism, and larger amounts of nitrogen, sulphuric acid, and phosphoric acid are excreted in the urine.

Boric acid up to 3 grammes daily has no effect. In larger doses, borax retards the assimilation of proteid and fatty food, whilst with very large doses there is a diarrhoeic tendency.

Borax decreases the volume of the urine, and, passing as such into this excretion, raises its specific gravity and renders it alkaline. Both borax and boric acid are rapidly eliminated, and so no cumulative action can result from their daily use. They have no influence on putrefaction in the intestine.

Inversion of Cane-Sugar in the Stomach. S. J. Ferris and G. Lusk. (*Amer. Journ. Physiol.*, 1898, 277-281.) The authors have investigated the inversion of cane-sugar which takes place in the stomach, and find that it is very considerable. They attribute it to the hydrochloric acid of the gastric juice, the action of which seems to be further assisted by the continual movement of the contents of the stomach.

Physiological Properties of the Liver. A. Mairét and M. Vires. (*Comptes Rendus*, cxxiii. 1076-1078, and *Int. Med. Mag.*, vi. 495.) The authors have observed coagulating and toxic effects in rabbits which were treated with intravenous injections of an

aqueous extract of rabbit's liver. After fatal doses, the blood was found to be coagulated in the heart and veins. By heating the extract, a coagulum is obtained; this contains the substance which produces the intravascular clotting; the filtrate is, however, still toxic, although it does not coagulate the blood.

In men, the administration of liver extract was followed by a lowering of temperature, laxative effects and increased diuresis, with a notable increase in the excretion of urea and phosphoric acid. These effects soon disappear after the administration of the extract is discontinued.

Effect of Fresh Thyroid and Iodothyryn on Metabolism. F. Voit. (*Zeit. Biol.*, xxxv. 116-154. From *Journ. Chem. Soc.*) The experiments were carried out on dogs in the usual way; the ingesta and egesta were analysed, both while the animal was taking normal diet and diet to which was added either fresh thyroid or iodothyryn. The result produced by either addition was the same, namely, an increase in the quantity of urine and excretion of nitrogen, a deficit in nitrogenous equilibrium, a loss of weight, a loss of fat, and an increase of excretion of carbonic anhydride. If the animals were in a state of inanition, these results were more marked. A review of previous work on the subject is given.

Toxicity of Perspiration. M. Arloing. (*Comptes Rendus*, cxxv. 219.) Human perspiration, when hypodermically administered to animals, produces toxic effects. The nature of the poison to which these effects are due has not yet been ascertained. The toxicity of perspiration secreted after vigorous exercise appears to be greater than that of the normal secretion.

Diphtheria Antitoxin. T. G. Brodie. (*Journ. Pathol. and Bacteriol.*, 1897, iv. 460-464.) The author's experiments were undertaken with the object of determining the nature of the substance present in the antitoxic diphtheria serum prepared from certain horses, which produces a rash. The results are at present incomplete. It was found that ether, alcohol, acetone, and chloroform extract a substance of an irritating nature from the dried serum; whether this is the material sought for is uncertain. The antitoxic properties of the serum are considerably weakened when redissolved; this is in part due to the process adopted, and the longer the precipitate is left in contact with the precipitant (acetone, or more rapidly with alcohol), the greater is the loss of power due to coagulation of proteid matter. The antitoxin itself is probably proteid in nature; its solubilities are those of a globulin

it will not pass through a gelatin filter, and its power is readily destroyed by dilute alkalis, less readily by dilute acids.

Tuberculinic Acid. E. A. de Schweinitz and M. Dorset. (*Journ. Amer. Chem. Soc.*, xix. 782. From *Pharm. Journ.*) The authors have succeeded in isolating from artificial cultures of tubercle bacillus a crystalline substance (m.p. 161–164° C.) readily soluble in ether, alcohol or water, which separated from its solutions in acicular or prismatic crystals with a slight yellow tint. The formula of this substance corresponded closely to $C_7H_{10}O_4$, the formula of teraconic acid, an unsaturated acid of the fatty series. Experiments conducted with this crystalline substance point to the conclusion that it is responsible for the coagulation necrosis of tissue which appears a necessary accompaniment of the progress of tuberculosis. Whether or not it is identical with teraconic acid remains yet to be proved, and its immunising effects have not yet been fully tested. Its solution appears, however, to exert some slight bactericidal action. Further experiments on the substance, which is tentatively termed tuberculinic acid, are proceeding.

Occurrence of Alcapton (Homogent'sic Acid) in the Urine of Neuralgic Patients. G. Denigès. (*Journ. de Pharm.* [6], v. 50–54. From *Journ. Chem. Soc.*) In a case of facial and sciatic neuralgia, it was found that, although polarimetric examination of the urine gave negative results, and the urine did not ferment in presence of yeast, the quantity of glucose indicated by Fehling's test was considerable.

In 1859, Boedecker separated, from urine of a similar nature, a substance, alcapton, which was shown by Wolkow and Baumann to be a homogent'sic acid, $C_6H_3(OH)_2 \cdot CH_2 \cdot COOH$.

The author succeeded in separating a quantity of this substance from the sample of urine in question. He further succeeded in showing that the quantity secreted is increased under meat diet, and is roughly proportional to the quantity of urea present. This confirms Baumann's theory that alcapton is formed by the breaking down of tyrosin.

Alcapton may be estimated in the following manner: 10 c.c. of filtered urine, 10 c.c. of ammonia solution, and 20 c.c. of decinormal silver nitrate solution are placed together in a flask for 5 minutes. Five drops of calcium chloride solution and 0.5 c.c. of ammonium carbonate solution are added; the solution is made up to 50 c.c., and filtered. The silver is estimated in half the filtrate. One molecule of alcapton, $C_8H_8O_4$, reduces 4 atoms of silver.

Presence of Uric Acid in the Saliva in Uric Acid Diathesis. M. Boucheron. (*Comptes Rendus Soc. Biol.*, 1896 [10], iii. 454-456.) The saliva of patients suffering from uric acid diathesis frequently contains uric acid, which can be detected in it by the murexide reaction.

Solubility of Organic Urates. K. Goldschmidt. (*Chem. Zeitung*, xxi. 544. From *Pharm. Journ.*) The author classes in two groups the organic bases which form urates soluble in water. The bases forming urates soluble in hot water are very numerous, including methylamine, benzylamine, nicotine, tetra-hydro-isquinoline; piperazine may also be added, though its urate is but slightly soluble in water. Among the bases forming urates soluble in cold water are piperidine, ethylamine, propylamine; the first of these is poisonous, and the last being very costly, ethylamine appears to be most suitable for use in the treatment of gout. The relatively sparing solubility of methylamine urate as compared with its higher homologues is remarkable, and apparently the solubility of the urates containing primary amines increases in proportion to the number of methyl groups in the molecule.

Rapid Estimation of Uric Acid in Urine. E. H. Bartley. (*Journ. Amer. Chem. Soc.*, xix. 649-656. From *Journ. Chem. Soc.*) 100 c.c. of the sample, mixed with 5 c.c. of magnesia mixture and 10 c.c. of ammonia of sp. gr. = 0.960, are heated on the water bath, and N/50 normal silver nitrate is then run in from a burette, a few drops of the liquid being, from time to time, filtered through a miniature cotton filter, and tested for excess of silver by means of a solution of sodium hydrogen sulphide. From the result, 1 c.c. is deducted, that being the amount of silver which will be in excess before any reaction is observed. Each c.c. of silver solution is equivalent to 0.00336 gramme of uric acid.

Estimation of Uric Acid in Urine. O. Folin. (*Zeitschr. für physiol. Chem.*, xxiv. 224, 225.) The author suggests a modification of Hopkins' method for estimating uric acid in urine, consisting mainly in the use of ammonium sulphate in the place of ammonium chloride for precipitating the acid. 10 grammes of the sulphate are added to 100 c.c. of urine, and after the mixture has been allowed to remain for two hours, the precipitated ammonium urate is collected on a filter, and washed with a 10 per cent. solution of ammonium sulphate until the washings are free from chlorine. The urate is now treated with a small quantity of dilute sulphuric acid, then dissolved in 15 c.c. of concentrated sulphuric acid, and titrated with N/20 permanganate solution, of which 1 c.c. corresponds to

3.75 milligrammes of uric acid. To the result obtained one milligramme is added as a correction for the solubility of the ammonium urate.

A New Volumetric Method for the Estimation of Uric Acid in Urine F. W. Tunncliffe and O. Rosenheim. (*Brit. Med. Journ.*, 1898, 364.) The uric acid is precipitated by ammonium chloride from 100 c.c. of urine, as directed by Hopkins, and the precipitated ammonium urate decomposed with hydrochloric acid. The uric acid thus precipitated is washed with small quantities of water until free from hydrochloric acid, then suspended in boiling water, and titrated with N/20 solution of piperidine in the presence of phenolphthalein. The end of the reaction is indicated by a red coloration, which remains on shaking, and also by the complete disappearance of any undissolved uric acid. One c.c. of the piperidine solution contains 0.00425 gramme of piperidine, and corresponds to 0.0084 gramme of uric acid.

Detection of Peptone in Urine. E. Friend. (*Pharm. Centralh.*, xxxix. 94.) The author states that it is possible to obtain urine perfectly free from nucleo-albumin and protalbumoses by the addition of small volumes of lead acetate solution. Urines containing less than 0.1 per cent. of albumin only require 2 drops of 10 per cent. solution for every 10 c.c. If more albumin is present, the following process is adopted:—The urine is boiled up after 1 drop of 20 per cent. acetic acid has been added, then neutralised with 1 or 2 drops of 20 per cent. potash solution, and precipitated with 2 to 3 drops of 10 per cent. lead acetate solution. The clear filtrate does not become turbid either with acetic acid and potassium ferrocyanide or on boiling. It is also free from the colouring matter of urine, and is well adapted for the direct application of the biuret reaction. If a turbidity should still result with potassium ferrocyanide, the treatment should be repeated with a smaller volume of lead acetate solution.

Estimation of Acetone in Urine. G. Argenson. (*Bull. de la Soc. Chim.* [3], xv. 1055-1058.) Léoben's method of determining acetone in urine consists in distilling the liquid until a fourth part has passed over, converting the acetone into iodoform, decomposing the latter with alcoholic potash, and determining the potassium iodide by means of a standard solution of silver nitrate. Numerous experiments having shown that the quantity of iodoform produced is invariably smaller than that required by the equation— $\text{C Me}_2 + 3 \text{I}_2 + 4 \text{KOH} = \text{CHI}_3 + \text{CH}_3\text{COOK} + 3 \text{KI} + 3 \text{H}_2\text{O}$, and depends largely, moreover, on experimental conditions, the

author has elaborated a table which supplies the weight of acetone per litre, corresponding with the volume of silver nitrate employed. The conditions for which this table holds good are clearly laid down.

Detection and Estimation of Albumin in Urine: E. Riegler. (*Pharm. Centralh.*, xxxviii. 349.) The reagent employed by the author consists of a solution of 8 grammes of asaprol (calcium sulphonate of β -naphthol), and the same quantity of citric acid in 200 c.c. of water. On adding 15 to 20 drops of this to 10 c.c. of albuminous urine, a precipitate or turbidity is produced, which does not disappear on heating. This behaviour towards heat readily distinguishes the albumin precipitate from any precipitate produced by albumose or peptone with the same reagent. The volume of the precipitate, after settling in a graduated tube, affords an indication of the quantity of albumin present, especially on comparison with the precipitate obtained under the same conditions with known quantities of albumin.

A Delicate Test for the Detection of Indican in Urine. A. Loubiou. (*Chem. Centr.*, 1897, 620.) 2 c.c. of strong hydrochloric acid are added in a test-tube to a mixture of 1 c.c. of the urine, 1 c.c. of chloroform and $\frac{1}{2}$ c.c. of solution of hydrogen peroxide. The tube is now gently heated and at the same time continually turned round its axis for a minute or two, and is then allowed to stand. The presence of indican will be indicated by the development of a blue colour in the chloroform layer.

Detection of Santonin in Urine. L. Daclin. (*Journ. de Pharm.* [6], v. 534.) About 30 c.c. of the urine are treated with solution of lead acetate, and afterwards with crystallised sodium sulphate. The mixture is then filtered, the filtrate divided into two halves, and each of these evaporated in a separate porcelain dish. One of the residues is warmed with a few drops of dilute sulphuric acid, when the presence of santonin will be indicated by the appearance of a violet coloration. Further evidence of its presence will be obtained by the pink coloration obtained on treating the residue in the second dish with a few drops of alcoholic potash solution.

An alternative process consists in the extraction of the urine with chloroform, and the application of the same tests to the residue left on evaporating the chloroform solution.

Modified Formula for Fehling's Solution. J. B. Tingle. (*Amer. Chem. Journ.*, xx. 126, 127.) 4.742 grammes of crystallised copper sulphate are dissolved in 200 c.c. of water and 38 c.c. of glycerin,

and mixed with 23.5 grammes of potassium hydrate dissolved in 200 c.c. of water; 450 c.c. of ammonia (sp. gr. = 0.90) are added, and the mixture is diluted to 1 litre. 35 c.c. of this solution correspond to 0.02 gramme of dextrose. In order to determine the latter, 35 c.c. of the copper solution are diluted with 70 c.c. of water, and heated to the boiling point; the sugar solution is then added, drop by drop, until the blue colour is discharged.

The chief advantages of this reagent over Fehling's solution are that it remains unchanged on keeping, and that it is not reduced by mineral acids, which always have a reducing action on Fehling's reagent unless a very large excess of alkali is present.

Detection of Cane-Sugar. G. Papasogli. (*Zeitschr. für analyt. Chem.*, xxxvi. 715.) When an aqueous solution of cane-sugar is mixed with a few drops of a solution of a cobalt salt and a slight excess of sodium hydrate, an amethyst violet coloration is produced. Grape-sugar, under the same conditions, yields a blue coloration, changing to dirty green. Gum or dextrin, if present, must first be removed by ammoniacal lead acetate, as otherwise the permanent blue coloration produced by these substances would mask the sugar reaction. By means of this test, cane-sugar can be detected even in the presence of 8 or 9 times its weight of grape-sugar. Coloured liquids should first be decolorized before applying the test.

Estimation of Sugar in Chocolate. X. Rocques. (*Chem. Centr.*, 1897, 268. From *Journ. Chem. Soc.*) Fifteen grammes of the sample are heated with 90 c.c. of water to 40° and well shaken, 15 c.c. of a 10 per cent. solution of lead acetate are added, and the liquid is filtered into a graduated measure; 70 c.c. of the filtrate are then mixed with 10 c.c. of acetic acid and 20 c.c. of a 10 per cent. solution of sodium sulphate to remove the excess of lead. The filtrate now contains all the cane-sugar, and also any glucose, which can be estimated in the usual way. To invert the cane-sugar, it is sufficient to dilute 50 c.c. of the filtrate with 450 c.c. of water, and heat the mixture in the water bath for 3 hours. Dilute acetic acid has no hydrolysing action on dextrin.

Estimation of Theobromine in Cocoa and Chocolate. L. Maupy. (*Journ. de Pharm.* [6], v. 329-332.) The fat is removed from 5 grammes of the finely powdered cocoa by boiling and subsequent maceration with 60 grammes of petroleum spirit, and the dry residue treated with 2 c.c. of water (in the case of chocolate, 4 c.c. of 70 per cent. alcohol are used instead of water), and heated for an hour with 20 grammes of a 15 per cent. solution of phenol in chloroform. When cold, the mixture is filtered, and the residue twice boiled

with 15 grammes of chloroform. The latter is distilled off from the united chloroform extracts, and the residue heated at 100° C. for at least half an hour. After cooling, 40 grammes of ether are added, and the mixture, after being well stirred, set aside for 6 hours. The theobromine is thus precipitated, while caffeine, colouring matters, and the last traces of fat are left in solution. The precipitate is collected on a weighed filter, washed with several c.c. of ether, and weighed.

Estimation of Caffeine in Tea. C. C. Keller. (*Chem. Centr.*, 1897, 1134, 1135.) 6 grammes of the powdered sample are well mixed with 120 grammes of chloroform in a separating funnel, and allowed to soak for several minutes, after which the mixture is shaken with 6 c.c. of 10 per cent. solution of ammonia for half an hour, and then allowed to stand for 6 hours. 100 grammes of the chloroform extract, representing 5 grammes of tea, are drawn off and distilled to dryness: the residue is moistened with 3 c.c. of absolute alcohol, and the latter evaporated in a strong current of air. The residue is then warmed with a mixture of 7 c.c. of water and 3 c.c. of alcohol, and the solution mixed with another 20 c.c. of water and filtered. Finally the clear filtrate is evaporated, and the residue, which is pure caffeine, weighed.

Estimation of Caffeine in Coffee. A. Forster and R. Riechelmann. (*Pharm. Zeitung*, xlii. 309.) 20 grammes of the ground roasted coffee are extracted by boiling four times with 200 c.c. of water, then diluted to 1000 c.c. and filtered. 600 c.c. of the filtrate are rendered alkaline with soda and extracted with chloroform. The chloroform extract is introduced into a Kjeldahl flask, the solvent distilled off, and the nitrogen determined by Kjeldahl's method. From the amount of nitrogen thus obtained that of the caffeine is readily calculated.

Estimation of Caffeine in Tea and Coffee. A. Hilger and A. Juckenack. (*Journ. de Pharm.* [6], vi. 184-186 and 190-192. From *Journ. Chem. Soc.*) Twenty grammes of finely ground coffee or powdered tea are digested at the ordinary temperature with 900 c.c. of water for several hours and then boiled, care being taken to replace the water lost by evaporation. Three hours' boiling is necessary for green coffee, only 1½ hours for roasted coffee or tea. After cooling to 60 to 80°, 7.5-8.0 grammes of aluminium acetate in solution (basic aluminium acetate solution of the German pharmacopœia) are run in, and then 1.9 grammes of sodium hydrogen carbonate are gradually added while the mixture is well stirred; it is then boiled for five minutes, allowed to cool, water added to make

the total weight 1020 grammes, and filtered. 750 grammes of the filtrate—corresponding with 15 grammes of coffee or tea—to which 10 grammes of dried and finely powdered aluminium hydrate and a little filter paper have been added, are evaporated to dryness, and the residue dried and extracted for 8 hours with purified carbon tetrachloride. The product obtained after removal of the carbon tetrachloride and drying is practically pure caffeine, containing at most 2–4 milligrammes of impurities. Calcium hydrate cannot be used in estimating caffeine, as it decomposes part of the alkaloid, according to Schultzen's equation, and converts the rest into caffeidine. Lead hydrate, obtained by means of ammonia, has no action on caffeine, neither has magnesia.

Caffeine obtained by Trillich and Göckel's method from roasted coffee contains large quantities of impurities, whereas that obtained from green coffee is practically pure. The authors think that the second alkaloid of coffee described by Forster and Riechelmann is a pyridine or a similar base produced during the roasting, since it does not occur in green coffee.

Estimation of Caffeine in Tea. G. L. Spencer. (*Journ. Amer. Chem. Soc.*, xix. 279–281.) 5 grammes of finely powdered tea are boiled with 400 c.c. of water for half an hour; the decoction is then digested for an hour with a large excess of freshly prepared ferric hydrate, and the mixture, when cool, diluted with water to 500 c.c. The caffeine is then titrated in a measured portion of the filtered liquid by Gomborg's method.

The New Pharmacopœia Test for the Purity of Quinine Sulphate. A. J. Cownley. (*Pharm. Journ.*, 4th series, vi. 412, 413.) The new test stipulates that 4 grammes of the quinine sulphate are to be dissolved in 120 c.c. of boiling water and the solution allowed to cool slowly to 50° C., with frequent stirring; the purified quinine sulphate which thus crystallises out is then separated by filtration. The filtrate is to be concentrated to 10 cubic centimetres or less, and when cold shaken with 10 cubic centimetres of ether, and half that amount of solution of ammonia. The mixture is set aside in a cool place for not less than 24 hours, and the crystals, which consist of cinchonidine and cinchonine combined with quinine, are collected on a tared filter, washed with a little ether, dried at 100° C., and weighed. These should not amount to more than 0.12 gramme. Quinine sulphate so tested should not yield more than a total of 3 per cent. of crystals of impure cinchonidine.

The directions also prescribe methods of testing for cinchonine,

quinidine, and cupreine, alkaloids which are never present in quinine sulphate of any known commercial manufacture.

For the purpose of ascertaining the value that can be attached to the new test, and the amount of impurity (cinchonidine) that might be passed in following out the directions exactly as described, two samples of quinine sulphate of well-known brands were examined by the author. The details of his experiments are fully described in the paper. The results demonstrate that a sample of quinine sulphate may contain an admixture of close upon 6 per cent. of crystallised cinchonidine sulphate and yet respond to the requirements of the new official test.

Colour Reactions of Opium Alkaloids. G. Bruylants. (*Zeitschr. für analyt. Chem.*, xxxvii. 62, 63.) The following colour reactions are given by the various opium alkaloids with Fröhde's reagent and the modifications of the test suggested by the author:—

	Fröhde reagent in the cold.	Fröhde reagent after warming.	Potassium nitrate added to hot mixture.
Morphine . .	Violet.	Green.	Red, then yellow.
Apomorphine	Greenish-blue.	<i>Ibid.</i>	<i>Ibid.</i>
Oxymorphine	Blue.	<i>Ibid.</i>	The violet changes to red. Like morphine.
Codeine . .	Dirty green, then blue.	<i>Ibid.</i>	Like morphine.
Narceine . .	Blue changing to green.	Dirty green.	Like morphine.
Narcotine . .	Green, then greenish-brown.	Green.	Violet, then transient red.
Papaverine .	Green, then blue, then red.	Green, then blue, then red.	Green rapidly disappearing.
Meconine . .	Very transient green.	Dirty blue.	<i>Ibid.</i>
Cryptopine .	Dirty green, then greenish-brown.	Dark brown.	<i>Ibid.</i>

A New Colour Reaction of Veratrine. G. Laves. (*Zeitschr. für analyt. Chem.*, xxxvii. 61.) A mixture of 1 c.c. of strong sulphuric acid with 3 or 4 drops of a 1 per cent. solution of furfuraldehyde is brought in contact with the veratrine solution, when a blue or bluish-violet coloration will appear in the intermediate zone, and will gradually change to green. On mixing, the whole becomes deep green, which again changes to blue or violet on warming.

Separation of Strychnine from Brucine. G. Sandor. (*Zeitschr. für analyt. Chem.*, xxxvii. 132.) 0.2 gramme of the mixture of the two alkaloids is dissolved by heat in the smallest requisite

proportion of dilute sulphuric acid (10 per cent.), the solution cooled, and treated with a sufficient quantity of a solution of 2 grammes of potassium permanganate in 100 c.c. of 10 per cent. sulphuric acid to produce just a distinct coloration. This treatment causes a complete destruction of the brucine, and after this has been effected, the liquid is rendered alkaline with ammonia, and extracted with a mixture of 20 grammes of chloroform and 30 grammes of ether, which takes up the strychnine and leaves it after evaporation of the solvent.

The Action of Sulphuric Acid on Strychnine in the Separation of this Alkaloid from Organic Matter. E. H. S. Bailey and W. Lange. (*Amer. Journ. Pharm.*, 1898, 18-21.) In the separation of strychnine from organic matter in toxicological examinations, it is found convenient to free the alkaloid from the last portions of organic matter by evaporation of the partially purified base with a drop or two of strong sulphuric acid. The authors therefore investigated the question, to what extent this treatment may involve a destruction of alkaloid. Their results show that, in spite of every care that may be taken, this sulphuric acid treatment decreases the delicacy of the reaction by which the final recognition of strychnine is effected. While $\frac{2}{100000}$ of a milligramme was detected in the original solution, only $\frac{1}{100000}$ of a milligramme could be detected after the treatment with sulphuric acid. The loss thus incurred, together with the more considerable loss resulting from the extraction of the alkaloid by agitation with chloroform, made it impossible to detect strychnine in solutions containing less than $\frac{2}{1000}$ of a milligramme. Though chloroform is an excellent solvent of strychnine, its usual mode of application extracts only a part of the quantity actually present in the organic matter under examination. It seems advisable, therefore, to conduct this shaking-out process with greater thoroughness than is generally done.

Detection of Atropine in Poisoning Cases. P. Soltsien. (*Chem. Centr.*, 1897, 1002.) In a case of poisoning by atropine reported upon by the author, an unsuccessful search for this alkaloid was made in the stomach, bowels, kidneys, liver and spleen. The urine alone gave indications of an alkaloid, which could be identified by its mydriatic action.

Detection of Vegetable Alkaloids and similar Active Principles in Forensic Investigations. A. Hilger and K. Jansen. (*Journ. Chem. Soc.*, from *Zeitschr. für analyt. Chem.*, xxxvi. 344-346.) The authors have applied the method of Küster (*Zeit. anal. Chem.*, xxix. 118) to the separation of the above substances. The method consists

in treating the material to be examined with alcoholic tartaric acid, evaporating the filtered extract with plaster of Paris, and extracting the powdered mass, first in an acid condition, and then after rendering alkaline, with ether and with chloroform in a Soxhlet extractor.

Strychnine is not extracted by ether, whether acid or alkaline. Chloroform extracts notable proportions from the acid mass, but the greater part after rendering alkaline. When strychnine or brucine has been mixed with decomposed animal matter, the ethereal extracts contain only ptomaines. When potato or beer is present, the ethereal extract from the acid mass will contain solanidine or hop-resin, the alkaline ether extract, and the chloroform extracts contain the alkaloids.

From animal and vegetable matters mixed with atropine, the acid ether extracts only traces of the alkaloid; the acid chloroform extracts the bulk of the atropine. The alkaline extracts contain only traces.

Veratrine is extracted by both solvents, from both acid and alkaline masses, but chloroform is the better solvent.

Colchicine and digitalin are best extracted by chloroform in the presence of alkali, although traces are extracted in the other three cases.

Morphine is not extracted by either solvent from an acid mass, but both solvents, as well as amylic alcohol, remove it from the alkaline mass.

The extracts containing the alkaloids are as a rule colourless.

Application of Bismuth Potassium Iodide for the Isolation of Alkaloids. E. Jahns. (*Archiv der Pharm.*, 1897, cexxxv. 151-156.) Kraut's reagent (solution of bismuth potassium iodide) is strongly recommended by the author for the isolation of alkaloids and other organic bases, such as choline, betaine, etc. The reagent is prepared by dissolving 80 grammes of bismuth subnitrate in 200 grammes of 1.18 sp. gr., and pouring the resulting liquid into a saturated aqueous solution of 272 grammes of potassium iodide. After separating the potassium nitrate which crystallises out on standing, the solution is diluted with water to 1 litre. This preparation greatly exceeds Dragendorff's reagent in delicacy. In order to employ it for the isolation of plant bases, the material is exhausted with water acidulated with sulphuric acid, the extract precipitated with lead acetate, the excess of lead removed with sodium phosphate, the filtrate then concentrated by evaporation, acidified with sulphuric acid, and precipitated with the bismuth solu-

tion. The washed precipitate is now boiled with water and barium carbonate, and the barium passing into solution removed by sulphuric acid and the hydriodic acid by means of silver carbonate. Any silver present in the filtrate may be precipitated by sulphuretted hydrogen. In this manner the author has been able to detect choline in *flor. matricariæ chamom.*, *herb. millefolii*, *herb. meliloti*, *fol. malvæ*, *herb. cochleariæ*, *fruct. anisi vulg.*, *cort. sambuci*, and *sem. robiniæ pseudacaciæ*. Choline and small quantities of betaine have been found in the seeds of *Lathyrus sativus* and of *L. cicera*. The so-called bursine isolated by Bombelon from shepherd's purse has been found to be identical with choline.

The author contradicts Classen's statement that narceine, solanine, and veratrine are not precipitated by Kraut's reagent.

Destruction of Organic Matter in Forensic Analyses. A. Villiers. (*Comptes Rendus*, cxxiv. 1458.) The author avails himself of the oxidising action of manganese salts for the purpose of effecting the destruction of organic matters in toxicological analyses. The substance under examination is treated with dilute hydrochloric acid, and an addition of solution of a manganese salt; nitric acid is added to this mixture in small successive quantities, a gentle heat being applied from time to time to keep up the action. The disintegration and oxidation of the organic matter is thus readily accomplished.

The Testing of Commercial Egg Albumin. P. Carles. (*Bull. de la Soc. de Pharm. de Bordeaux*, xxxvii. 132.) Two grammes of the albumin are weighed, mixed thoroughly with a little water, then more water is gradually added, with thorough agitation, to bring up the volume to 200 c.c. If the albumin is free from coagulated particles, the solution should be translucent; 100 c.c. of this solution is taken, and 35 c.c. of a 1 per cent. solution of tannin added, together with a small pinch of potassium bitartrate: the mixture is then well shaken, and about 15 c.c. of it thrown on a filter. The filtrate is divided into two equal parts, to one of which a few drops of a 1 per mille solution of pure gelatin and to the other a small quantity of the tannin solution are added. If no sensible precipitate is formed in either tube the sample is free from either added matter or from coagulated albumin. If the gelatin solution forms a precipitate, it shows that all the tannin has not been precipitated, and that therefore the sample is weak in coagulating power. If, on the other hand, the addition of tannin causes a turbidity, it indicates the presence of some body, probably gelatin, which has a greater affinity for tannin than egg albumin. Thus a sample sold as pure

egg albumin was found to contain only 50 per cent. of that body, and 50 per cent. of gelatin.

Estimation of Casein in Milk. G. Denigès. (*Pharm. Centralh.*, xxxviii. 571.) 25 c.c. of the milk are mixed with 20 c.c. of decinormal solution of potassio-mercuric iodide and 2 c.c. of acetic acid; the mixture is made up to 200 c.c., and the liquid filtered. The excess of mercury is then determined in 100 c.c. of the filtrate by adding 10 c.c. of solution of ammonia and 10 c.c. of decinormal potassium cyanide solution, and titrating with decinormal silver nitrate until a permanent turbidity is obtained. The percentage of casein is deduced from the volume of the silver solution used, by reference to a table appended to the original paper.

Detection and Estimation of Sodium Bicarbonate in Milk. L. Padé. (*Chem. Centr.*, 1897, 337.) The alkalinity of the soluble ash from 10 grammes of normal milk is so slight that one single drop of decinormal sulphuric acid is sufficient to neutralise it. A greater alkalinity would therefore indicate an addition of sodium bicarbonate or some other alkaline salt. In estimating the proportion of such an addition by determining the alkalinity of the soluble ash by titration, it may be necessary to take into account the possible conversion of some of the added soda into phosphate. It is advisable, therefore, to also estimate the soluble phosphoric acid in order to calculate from this the corresponding amount of sodium bicarbonate.

Rapid Estimation of Boric Acid in Milk. G. Denigès. (*Journ. Chem. Soc.*, November, 1897, from *Journ. de Pharm.* [6], vi. 49-54.) According to Farrington (*Year-Book of Pharmacy*, 1897, 114), a solution of boric acid in milk shows a greater acidity than when the same amount of acid is dissolved in water. This is owing to the action of milk-sugar. The author finds that, for solutions containing 1, 2, or 3 grammes of boric acid per litre, the solutions in milk do not exhibit so great an acidity as do corresponding solutions in water mixed with glycerin. He suggests the following process based on these observations:—Twenty c.c. of milk are placed in each of two flasks, to one of which 2 or 3 drops of phenolphthalein and sufficient N/10 sodium hydrate to cause a permanent pink tint are added; 10 c.c. of a mixture of equal volumes of ethylic alcohol (90°) and glycerin are then added, and subsequently sufficient N/10 sodium hydrate to bring back the pink colour which had disappeared. If n = the number of c.c. of N/10 alkali required in the second case, then $n-0.15$ gives in grammes the amount of boric acid in 1 litre of milk. The amount

is correct to 1 or 2 decigrammes. If the milk contains more than 3 grammes of boric acid per litre, it is necessary to dilute before taking the 20 c.c. The method is only accurate when the amount of boric acid is below 3 grammes per litre and the amount of milk-sugar is between 40 and 50 grammes per litre.

Detection of Annatto in Milk. A. Leys. (*Pharm. Journ.*, from *Journ. de Pharm.* [6], vii. 287.) Milk is often coloured with a trace of annatto to give it a fictitious appearance of richness. To detect this addition, the author employs the following test:— Fifty c.c. of the sample are shaken out with twice the volume of ether-alcohol mixture composed of 240 parts of alcohol of 93 per cent., 320 parts of ether, 20 parts of water, and 8 parts of solution of ammonia of .920 specific gravity. After separation, the ethereal layer is rejected, the colouring matter being retained in the aqueous portion. This is transferred to another vessel and half its volume of a 10 per cent. solution of sodium sulphate gradually added, which causes the slow separation of the casein. The clear aqueous portion is decanted and shaken out with amyllic alcohol, the washing being conducted in test-tubes to facilitate the separation of the solvent. After shaking, these tubes are plunged into a cold water-bath, the temperature of which is gradually raised to 80° C., when separation will be complete. The amyllic alcohol solution is collected and evaporated. The deep yellow residue is re-dissolved in warm water containing a little ammonia and alcohol, a strip of bleached cotton is immersed in the solution, and the whole evaporated to dryness. The cotton, which is now of a yellow tint, is washed and plunged into a solution of citric acid. If the colouring be annatto, the thread will at once assume a marked rose tint. Uncoloured normal milk imparts a very slight yellow tint to cotton by this method, but does not give the change of tint with citric acid, which is characteristic of annatto.

Assay of Lactic Acid. F. Ulzer and H. Seidel. (*Monatshefte*, xviii. 138–141.) The purity of a sample of lactic acid can be estimated conveniently by dissolving about 1 gramme of the sample in 100 c.c. of water containing 3 grammes of potassium hydrate; adding gradually, and with continual shaking, a 5 per cent. solution of potassium permanganate until the liquid has no longer a green, but a bluish-black colour, boiling (when the bluish-black colour must still remain), decolorising by the addition of hydrogen peroxide or sulphurous acid, filtering, acidifying with dilute sulphuric acid, and titrating the oxalic acid with standard permanganate solution. It is assumed that the lactic acid has been

oxidised in accordance with the equation $C_3H_6O_3 + 5O = C_2H_2O_4 + 2H_2O + CO_2$. In this way a sample of Merck's "chemically pure" acid was found to contain 90.13 per cent. of $C_3H_6O_3$; by boiling with excess of standard potassium hydrate and titrating the excess, 89.50 was found. The same sample gave only 74.05 per cent. when titrated with potassium hydrate in the cold, so that it must have contained a large amount of lactone-anhydride; a sample of commercial acid was found to contain an even larger amount.

Palm's method of estimating lactic acid by precipitating with lead acetate and alcoholic ammonia, and weighing the precipitate as $3PbO, 2C_3H_6O_3$, after drying it at 100° , does not give concordant results.

Estimation of Farinaceous Admixtures in Sausages. J. Mayrhofer. (*Chem. Centr.*, 1897, 204, 205. From *Journ. Chem. Soc.*) From 10 to 20 grammes of the sample are heated at 100° with 50 c.c. of an 8 per cent. alcoholic solution of potash until the meat has dissolved; the mixture is then diluted with proof spirit, and the insoluble portion collected on a filter and washed first with hot alcoholic potash and then with alcohol, until the filtrate no longer gives any turbidity on acidifying. The filter with the unsoluble matter is now put back into the beaker, and, after being treated for half an hour on the water bath with 60 c.c. of normal potash and allowed to cool, is acidified with acetic acid, and water added to make the whole up to 100 c.c. In an aliquot part of the liquid, the starch is then precipitated by adding an equal volume of strong alcohol; the precipitate is collected, and after being washed first with proof spirit, then with strong alcohol, and finally with ether, is dried and weighed.

Test for the Purity of Lard. (*Pharm. Journ.*, from *Pharm. Centralth*, xxxviii. 353.) An important clue to the purity of lard is the iodine number of the oleic acid. Mansfield gives the following method of applying the test:—Dissolve 10 grammes of the separated fatty acids in 100 c.c. of ether, and shake with 3 grammes of oxide of zinc until the fluid thickens. The resulting oleate of zinc remains in solution while the non-soluble palmitate and stearate are separated. After the filtration of the mixture and distillation of the ether, the residual soap is decomposed with diluted hydrochloric acid, and the separated oleic acid again washed and dried. 0.2 gramme is used for the determination of the iodine number.

Characteristic Reaction of Cotton-Seed Oil. G. Halphen. (*Journ. de Pharm.* [6], vi. 390-392.) If 2 c.c. of carbon bisul-

phide containing 1 per cent. of free sulphur are mixed in a test-tube with 2 c.c. of amyl alcohol and 2 c.c. of the oil under examination, and the mixture is then heated for 15 minutes in a boiling solution of common salt, the presence of cotton-seed oil will be indicated by the development of a red or orange coloration.

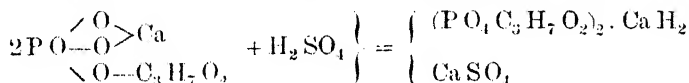
Detection of Cotton-Seed Oil in Olive Oil. M. Tortelli and R. Ruggeri. (*Pharm. Journ.*, 4th series, vi. 505.) The following modification of Bechi's test is stated to be capable of detecting the addition of 1 per cent. of cotton-seed oil to olive or other vegetable oils:—Five grammes of the oil are saponified by boiling with alcoholic potash solution, and the alkaline soap solution neutralised with acetic acid. This is then poured in a thin stream, when boiling, with constant agitation, into a warm mixture of 50 c.c. of 10 per cent. lead acetate solution and 250 c.c. of water. The lead soap thus obtained is washed with three successive portions of water of 60–70° C., cooled, well drained, then gently boiled in 120 c.c. of ether under a reflux condenser for twenty minutes. After cooling, the ethereal solution is decanted, filtered, and washed twice with 60 c.c. of 10 per cent. HCl and once with more dilute acid, and then with water, the acid washings containing lead chloride being rejected. The ethereal solution is filtered into a small flask and the solvent distilled off. The flask is then washed out with a reagent consisting of 10 c.c. of 90 per cent. alcohol and 1 c.c. of 5 per cent. silver nitrate solution. The mixture is transferred to a test-tube, which is plunged into a water bath heated between 70° and 80° C. If the original oil be pure, the liquid remains unaltered for fifteen minutes or even for hours. If cotton-seed oil be present, however, even in as small a quantity as 1 per cent., the liquid quickly shows signs of reduction, which becomes more intense in time.

Detection of Sesame Oil as an Adulterant of Olive Oil. A. J. F. da Silva. (*Bull. de la Soc. Chim.*, xix. 88. From *Pharm. Journ.*) The author confirms the statement of E. Milliau that Baudoin and De Latil's test for the presence of sesame oil in olive oil is not trustworthy, as a similar reaction—the production of a rose coloration when the oil is treated with hydrochloric acid and sugar—may be obtained with olive oils that are known to be pure. If, however, pyrogallol be substituted for the sugar, as in Toches' reagent, more satisfactory results are obtained, whether the oil itself be operated upon or the separated fatty acids. The reagent consists of 2 grammes of pyrogallol and 30 grammes of hydrochloric acid. Equal weights of this mixture and the oil to

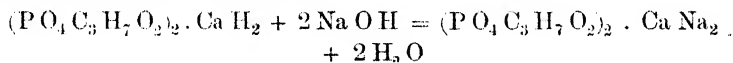
be examined are shaken together, and after being allowed to stand awhile the acid layer is separated and heated for five minutes. If sesame oil be present, a reddish-purple colour appears.

Detection of Glycerin. G. Denigès. (*Chem. Centr.*, 1897, 1002, 1003.) The glycerin is isolated from the liquid under examination by the usual method of extracting the dried-up substance with a mixture of alcohol and ether. The solution thus obtained is filtered and evaporated, and the residue heated in a small retort with potassium bisulphate, when the presence of glycerin will be indicated by the development of acraldehyde, which is recognised by its pungent odour and by the brown coloration imparted by the fumes to a drop of Nessler's solution exposed to them at the end of a glass rod. Instead of with Nessler's solution, the fumes may be tested with ammoniacal silver nitrate in the same way.

Assay of Glycerophosphates. A. Astruc. (*Journ. de Pharm.* [6], vii. 5. From *Pharm. Journ.*) The author has confirmed the view that calcium glycerophosphates in solution are alkaline to methyl-orange, and that they may be either acid or alkaline to phenolphthalein. To determine the amount of phosphoric acid present, he neutralizes a known volume of glycerophosphate solution with sulphuric or hydrochloric acid, with methyl-orange as indicator, then titrates the solution with standard alkali and phenolphthalein. In the equation representing the first reaction—



one molecule of mineral acid corresponds to two molecules of phosphoric acid, and in the second—



or,



one molecule of phosphoric anhydride corresponds to two molecules of soda. The quantity of phosphorus pentoxide in solution can thus be calculated, the results obtained being about 0.5 per cent. lower than those obtained by calcining a known weight of glycerophosphate, dissolving the ash in hydrochloric acid, and determining the phosphorus as magnesium pyrophosphate. The author concludes that the phosphoric acid in glycerophosphates can be determined very closely and rapidly by the method he describes ;

that the glycerophosphates of lime appear to decompose, even during their preparation; and that undecomposed calcium glycerophosphate seems to require a quantity of acid equivalent to that of the soda necessary to act on phenolphthalein in order to react on methyl-orange.

Comparative Accuracy of Titrimetric and Gasometric Methods of Estimating Hydrogen Peroxide in Presence of various Preservative Agents. C. E. Smith. (*Amer. Journ. Pharm.*, 1898, 225-234.) The results of the author's experiments lead to the following conclusions:—

The titrimetric permanganate method is accurate and reliable for the valuation of solutions containing only mineral acids and their alkali salts as impurities. With solutions containing glycerin or boroglycerin in quantities below 5 per cent. the results are but slightly raised; in presence of larger amounts the method is inapplicable. Etheral solutions give results a little too high. Salicylic acid interferes seriously, even in small quantity. The use of this method should be avoided whenever organic matters are suspected to be present. Applied gasometrically, the permanganate method is unreliable in all cases.

The hypochlorite method gives serviceable results in the absence of preservatives. In their presence the results are liable to fall too low, and with etheral solutions they are too high.

The hyposulphite method is simple, rapid, and accurate, and its accuracy is not lessened by the presence of the usual preservative agents, nor by large quantities of glycerin. It is applicable in all cases, so far as known. It can be said of gasometric determinations in general, that they require more time, attention, and apparatus than titration methods, and that the results obtained by them cannot be expected to approach the latter in accuracy unless suitable corrections are made for variation in temperature and atmospheric pressure.

Assay of Boric Cotton or Lint. (*Chemist and Druggist*, li. 235.) Five grammes of the lint or cotton-wool are shaken in a $\frac{1}{2}$ -litre flask with 400 c.c. of a mixture of 1 part of glycerin and 19 parts of water, and the flask is then filled up to 500 c.c. with water. The mixture is allowed to settle, and 100 c.c. of the decanted fluid are titrated with decinormal soda solution, using phenolphthalein as an indicator. The number of c.c. used multiplied by 0.0062 gives the amount of boric acid in 1 gramme of the sample.

Colour Reactions of Nitric and Chloric Acids. E. C. Woodruff. (*Journ. Amer. Chem. Soc.*, xix. 156-170.) Nitric acid may

be readily detected in presence of chloric acid by the following test:—A solution of 2 grammes of dimethylaniline in 100 c.c. of concentrated sulphuric acid becomes a very strong blood-red when nitric acid alone is added, and brown with chloric acid alone, whilst a mixture of nitric and chloric acid produces only the strong blood-red colour noticed with nitric acid alone.

The bulk of this paper is devoted to the colour reactions produced with these two acids by numerous organic substances.

Separation of Chlorine from Bromine. H. Baubigny and P. Rivals. (*Comptes Rendus*, cxxiv. 859–862; cxxv. 527–530 and 607–610.) Weak aqueous solutions of alkaline bromides or chlorides are not decomposed by potassium permanganate under ordinary conditions. But in the presence of a sufficient quantity of copper a complete decomposition of the bromide can be effected without any appreciable decomposition of chlorides present at the same time. The following directions are given for the separation of the two halogens in this manner:—The carefully neutralised solution containing the alkaline chloride and bromide is mixed with an excess of cupric sulphate; permanganate is then added in sufficient quantity, and the mixture allowed to evaporate in a large flat dish in vacuo over potassium hydrate at the ordinary temperature. In order to expel every trace of liberated bromine the residue is moistened with water, and this again allowed to evaporate under the same conditions. The excess of permanganate is now reduced with sulphurous acid, and the chlorine precipitated by silver nitrate in the presence of a sufficient quantity of nitric acid.

Modifications intended for the direct estimation of the liberated bromine by the same process will be found fully described in the original papers.

Application of Barium Hyposulphite in Iodimetry. M. Mutnianski. (*Zeitschr. für analyt. Chem.*, 1897, 220.) This barium salt is prepared by mixing hot concentrated solutions of 5 parts of sodium hyposulphite and 4 parts of barium chloride, and washing the precipitate, first with warm, then with cold water, afterwards with 95 per cent. alcohol, and finally with ether. The product may be used for iodimetric titrations without previous standardization, as it so happens that a saturated solution prepared by shaking an excess of the air-dried salt for 15 minutes with water of 17.5°C. is exactly of centinormal strength.

A Convenient Starch Indicator for Iodimetric Titrations. M. Mutnianski. (*Zeitschr. für analyt. Chem.*, 1897, 221.) A mixture of 5 grammes of potato starch and 0.01 gramme of mer-

curic iodide and 30 c.c. of cold water is poured into a litre of boiling water, the solution boiled for a few minutes, and then allowed to cool and settle. The clarified product can be kept for years without losing its sensitiveness.

Determination of Alkalinity or Acidity in Dark-coloured Liquids.

F. Jean. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxvi. 101. (1) Alkaline liquids are distilled with an excess of ammonium sulphate, and the ammonia thus liberated is titrated in the distillate and calculated for KHO or NaHO as the case may be.

(2) Acid liquids are distilled in a suitable apparatus with an excess of ammonium sulphate and 10 to 20 c.c. of normal alkali, the ammonia which passes over being absorbed by 10 to 20 c.c. of normal acid. From the amount of ammonia found, in comparison with the larger quantity which would have been found but for the presence of acid in the original liquid, the acidity of the latter, expressed as HCl or H_2SO_4 , etc., may be readily calculated.

Detection of Normal Alkali Carbonates in Alkali Bicarbonates.

A. Leys. (*Journ. de Pharm.* [6], vi. 440-442.) Solution of calcium sulphate does not produce an immediate precipitate with pure alkali bicarbonates, but in the presence of even traces of monocarbonate it causes a precipitate or turbidity at once. This test will also admit of the detection of monocarbonate in the presence of a large quantity of borax. Both in the case of alkali bicarbonates and of borax, magnesium sulphate fails to indicate the presence of small quantities of alkali monocarbonate.

Estimation of Potassium as Platinochloride. H. N. Warren. (*Chem. News*, 1897, lxxv. 256.) The solution of the alkali chlorides, free from metals of other groups, is heated with an excess of platinic chloride, and evaporated to a small bulk in a platinum dish. The residue is treated with a mixture of equal volumes of amyl alcohol and ether, and the precipitate washed with the same mixture. The washed precipitate is heated in a small beaker to the boiling point with about 5 c.c. of formic acid. Ammonia is then added in very slight excess, the mixture again boiled, and the precipitated platinum washed, dried, and weighed. From the weight of platinum thus obtained the percentage of potassium is readily calculated.

Volumetric Estimation of Sodium. H. J. H. Fenton. (*Proc. Chem. Soc.*, 1898, No. 188.) Dihydroxytartaric acid, in presence of dilute sulphuric acid, is readily oxidised by potassium permanganate at the ordinary temperature, the reaction affording a very

convenient method for the estimation of the acid or its salts. A method has been devised for the quantitative estimation of sodium based upon this relation and upon the sparing solubility of sodium dihydroxytartrate. The solubility of the sodium salt at 0° is shown to be extremely small, and in presence of excess of a dihydroxytartrate is practically negligible.

The substance to be examined, in concentrated neutral solution, is mixed with excess of potassium dihydroxytartrate and the mixture is kept at 0° for half an hour. The precipitated sodium salt is washed with a little ice-cold water, dissolved in excess of dilute sulphuric acid and titrated with potassium permanganate.

The results obtained with sodium sulphate, chloride, nitrate, acetate, and with rochelle salt, are accurate within 0.3 per cent. The presence of magnesium does not interfere with the accuracy of the results, but ammonium salts, if present in excess, lead to low results. Full details for working the process are given in the paper.

The potassium and ammonium salts of dihydroxytartaric acid have been prepared and examined, and, together with other derivatives of the acid, will be described in a future communication.

Estimation of Sodium in Presence of Potassium. F. F. Beilstein and O. von Blaese. (*Zeitschr. für analyt. Chem.*, xxxvi. 513.) The sodium is precipitated by potassium antimonate from a neutral solution containing the two metals in the form of chlorides or nitrates. After twenty-four hours the supernatant liquid is decanted, and the precipitated NaSbO_3 washed with a 0.7 per cent. solution of potassium acetate (free from carbonate) and subsequently with alcohol of 50 per cent. The precipitate is then ignited and weighed, and a correction made by adding 0.0233 gramme to the weight for every 100 c.c. of the decanted liquid.

Assay of Commercial Citrate of Lime. A. Soldaini and E. Berté. (*Chemist and Druggist*, lii. 924.) The author has critically compared the lime method and the lead method for the assay of this salt, as these do not give identical results, the lead process generally giving a somewhat higher percentage of calcium citrate than the other. He arrives at the conclusion that the lime method is the more expeditious one of the two, but that the lead process has the advantage of greater exactitude. He confirms the correctness of the formula $\text{Ca}_3(\text{C}_6\text{H}_5\text{O}_7)_2 \cdot 4\text{H}_2\text{O}$ for pure calcium citrate dried in a water-oven, and finds that 2 of the 4 molecules of water are expelled from the salt at $115\text{--}125^{\circ}\text{C}$., and the others at $180\text{--}195^{\circ}\text{C}$.

Use of Sodium Peroxide in Chemical Analysis. C. Glaser. (*Journ. Amer. Chem. Soc.*, xx. 130.) The author cannot confirm O. Kassner's statement that iron is not oxidised to ferric acid by sodium peroxide; the statement only holds good if the reagent is added to a solution of an iron salt, without the precaution of keeping the temperature of the latter sufficiently low. Exception is also taken to J. Clark's statement that the action of the peroxide on coke and coal is too violent to permit of use in analysis, as it has been used in coke, coal, and asphalt analyses for sulphur with perfect success. It is necessary that the material to be analysed should be placed in a sufficiently large silver or nickel dish and covered with about four times its weight of sodium carbonate. The dry peroxide is then dusted upon the mass from a porcelain or platinum spoon, in small quantities at a time, until all the carbon is consumed. The mass is now fused by heat, and the sulphur determined in it in the ordinary way. Used in this manner sodium peroxide is a very useful and convenient reagent, applicable in a great number and variety of cases.

Detection of Arsenic and Antimony in Presence of Tin. E. Donath. (*Zeitschr. für analyt. Chem.*, xxxvi. 665.) The solution is mixed with a large excess of stannous chloride strongly acidified with hydrochloric acid, the mixture is heated to the boiling point and a solution of sodium sulphite or sulphurous acid added drop by drop to the boiling liquid. The arsenic and antimony are thus precipitated as sulphides, while the tin is left in solution. The two sulphides are then separated from each other by any of the usual methods. The foregoing process is based on the reduction of sulphurous acid to sulphuretted hydrogen by the acid stannous solution. It may also be applied for the detection of arsenic in commercial sulphuric acid.

Qualitative Separation of Arsenic, Antimony, and Tin. S. G. Rawson. (*Journ. Soc. Chem. Ind.*, xvi. 113.) The author advocates Clarke's oxalic acid method, carried out as follows:—The washed sulphides are boiled with a small quantity of hydrochloric acid, to which a drop of nitric acid is added; this will often suffice to prove the presence of arsenious sulphide, which dissolves with greater difficulty than the sulphides of antimony and tin. A strong solution and crystals of oxalic acid are then added, so as to obtain a saturated solution when hot, and sulphuretted hydrogen is passed through it, when antimony and arsenic are precipitated, whilst the tin remains dissolved. To the filtrate ammonia is added, and if a precipitate is produced this is redissolved by cautious addition of

ammonium sulphide; on adding acetic acid, the tin is precipitated as a mixture of oxide and sulphide. The antimony and arsenic are best distinguished by Hofmann's well-known method of passing their hydrides through silver nitrate.

Quantitative Separation of Arsenic and Antimony. O. Piloty and A. Stock. (*Ber. der deutsch. chem. Ges.*, 1897, 1649-1655.) The following process is recommended as expeditious and very accurate:—The substance under examination is placed in a round-bottomed flask of about 300 c.c. capacity, and is then dissolved in 100 c.c. of concentrated hydrochloric acid, the flask is fitted up as if for steam distillation, except that the longer tube is provided with a T-piece at its upper extremity to allow of the introduction of both hydrochloric acid and sulphuretted hydrogen gases, and that the shorter tube is bent and passes into a receiver of about 600 c.c. capacity surrounded with ice. The contents of the round flask are heated to boiling, and a rapid stream of hydrochloric acid gas is passed through. When the whole apparatus has become filled with steam, the sulphuretted hydrogen is admitted at the rate of about two small bubbles per second. The distillation is continued until only a few c.c. of liquid remain in the flask, an operation which requires $\frac{1}{2}$ – $\frac{3}{4}$ of an hour. All the arsenic is found in the receiver in the form of the trisulphide, mixed with free sulphur: it is collected, dissolved in as little dilute potash as possible, and then oxidised with bromine water, a slight excess of hydrochloric acid is added, and the contents of the flask briskly boiled until all traces of free bromine have disappeared. The clear hydrochloric acid solution is then heated at 70° for 3 hours while a stream of sulphuretted hydrogen is passed through, the gas is also kept passing through as the solution cools, and the saturated solution is then put aside for 12 hours, when the arsenic pentasulphide may be collected on to a Gooch crucible, washed with water, absolute alcohol, pure carbon bisulphide, alcohol, and dry ether, then dried at 105° and weighed. The antimony may be estimated in the clear solution left in the round-bottomed flask by precipitating as sulphide, and treating in exactly the same way as the arsenic pentasulphide.

Application of Acid Solutions of Arsenious Acid in Volumetric Analysis. M. Bialobrzewski. (*Pharm. Zeitschr. für Russl.*, xxxv. 785-789. From *Journ. Chem. Soc.*) The author has found that the reaction between iodine and arsenious acid takes place quantitatively in the presence of an acetate and free acetic acid at a temperature of about 70°. To estimate the available chlorine in

bleaching powder, the prepared solution is mixed with an excess of standard arsenious acid dissolved in ammonium acetate; after acidifying with acetic acid and warming to 60° , the excess of arsenic is titrated with standard iodine. Chlorates may be estimated by first adding excess of the arsenic and then excess of hydrochloric acid; the liquid is afterwards neutralised with ammonia, acidified with acetic acid, and titrated with iodine. Peroxides may be estimated in a similar manner by gently heating them with hydrochloric acid in the presence of an excess of the arsenical solution and titrating the latter as directed. The process may also be applied to chromates and to the indirect estimation of lead.

Estimation of Mercuric Salts. L. Vanino and F. Treubert. (*Ber. der deutsch. chem. Ges.*, **xxf.** 2808, 2809.) The solution is acidified with hydrochloric acid, mixed with an excess of hydrogen peroxide, and warmed on a water-bath with a sufficient quantity of phosphorous acid, until complete separation of the mercury as mercurous chloride has taken place. The hydrogen peroxide prevents any further reduction to metallic mercury. The precipitated calomel is collected on a tared filter, dried at 105°C ., and weighed.

Separation of Mercuric and Bismuth Salts. L. Vanino and F. Treubert. (*Ber. der deutsch. chem. Ges.*, **xxxi.** 129, 130.) The mercury is precipitated from the acidified solution as calomel by means of hypophosphorous acid in the presence of hydrogen peroxide (see preceding abstract). The filtrate is then rendered alkaline with soda, freed from hydrogen peroxide by heating, and then again treated with hypophosphorous acid, which precipitates the bismuth in the metallic state.

Assay of Reduced Iron. E. Schmidt. (*Zeitschr. des oesterr. Apoth. Ver.*, **xxxv.** 623, 624.) The method described in this paper consists in the separation of the metallic iron from the oxides by means of iodine, and the subsequent estimation of the excess of the iodine by titration. 0.4 gramme of the finely powdered sample is treated in a 100 c.c. flask with 10 c.c. of water, and then slowly with 2 to 2.5 grammes of powdered pure (and dry) iodine, the latter being added gradually from a weighed tube. When the action is completed, any iodine adhering to the neck of the flask is washed down with water, 1 gramme of potassium iodide is added, and, after the iodine is all dissolved, the liquid is diluted with water to exactly 100 c.c. It is then shaken and allowed to settle, and the excess of iodine is now titrated in 50 c.c. of the clear

liquid by means of decinormal solution of sodium hyposulphite. After deducting the total excess of iodine from the entire quantity originally taken, the difference represents the amount of iodine used up in the formation of ferrous iodide, from which the percentage of metallic iron in the sample is readily calculated.

A New and Rapid Method for the Qualitative Separation of Iron, Aluminium, Chromium, Manganese, Zinc, Nickel and Cobalt. A. R. Cushman. (*Amer. Chem. Journ.*, xix. 606, 607. From *Journ. Chem. Soc.*) Precipitate with ammonium chloride, ammonia, and ammonium sulphide. Warm the well-washed precipitate with moderately dilute hydrochloric acid in a porcelain dish; complete solution indicates the absence of nickel and cobalt, but if a black residue remains, this is dissolved by adding aqua regia. The excess of acid and chlorine is then expelled by evaporation, the solution made strongly alkaline with ammonia (after previously adding ammonium chloride in case the amount of hydrochloric acid used on the sulphides was small), bromine solution is added in excess, the whole allowed to remain a few minutes and filtered, giving precipitate (1) and filtrate (1).

The *precipitate* (1), removed from the filter, is treated with potassium hydrate in excess, and with bromine solution, and filtered, the *filtrate* being (2). A portion of the *residue* is dissolved in hydrochloric acid, and tested for iron with sulphocyanide; another portion is tested for manganese by fusion with sodium carbonate and nitrate. A portion of the filtrate (2) is acidified with hydrochloric acid, treated with excess of ammonium carbonate, and boiled, to see if aluminium is present; another portion is tested for chromium with acetic acid and lead acetate.

To the original *filtrate* (1) a large excess of potassium hydrate is added, and the whole filtered after a few minutes. The greenish-white *precipitate* (2) is nickel, and is confirmed by the blow-pipe test with a bead of microcosmic salt. The *filtrate* (3) from this is boiled, when cobalt is precipitated, and is confirmed by the borax bead, whilst the filtered solution (4) is tested for zinc by acidifying with acetic acid and saturating with hydrogen sulphide, the presence of the metal being confirmed by igniting the precipitate with cobalt nitrate on charcoal.

Rapid Valuation of Zinc Dust. A. R. Wahl. (*Journ. Soc. Chem. Ind.*, xvi. 15.) The author effects this assay by oxidation with neutral ferric sulphate and subsequent titration of the un-reduced iron with potassium permanganate. The ferric sulphate is prepared by oxidising a mixture of 5 parts of ferrous sulphate

and 1 part of sulphuric acid by excess of nitric acid, evaporating to dryness, grinding, washing with alcohol until no longer acid, and drying thoroughly. The assay is carried out by shaking 0.5 gramme of the zinc dust with 25 c.c. of cold water, adding 7 grammes of the ferric sulphate, and agitating the mixture occasionally until the zinc (with the exception of impurities) is dissolved, which will take about quarter of an hour. The solution is then acidified, and titrated with permanganate.

Colorimetric Estimation of Manganese in Plant Ashes. M. Lemaire. (*Bull. Soc. Pharm. Bord.*, 1897, 268.) The author's process is based on Hoppe-Seyler's reaction, and is carried out as follows:—1 gramme of the ash is boiled with 25 c.c. of dilute nitric acid (1:5) and 1 gramme of pure lead peroxide for four minutes. The violet coloration thus produced in the presence of manganese is then compared with that obtained in the same manner with solutions of pure manganese sulphate of known strength. By this method 0.0001–0.0002 per cent. of manganese could be detected and estimated in the ash of *Cichorium intybus*.

The Testing of Formaldehyde. C. E. Smith. (*Pharm. Journ.*, from *Amer. Journ. Pharm.*, 1898, 86–94.) The author describes a modification of Legler's ammonia method for testing formaldehyde, which yields results closely agreeing with those obtained by the hydroxylamine, fixed alkali, and ordinary ammonia methods. The following is the method of procedure:—Dissolve 2 grammes of pure neutral ammonium chloride in 25 c.c. of water, and introduce the solution into a flask provided with a well-fitting stopper. Then add 2.25 grammes of the sample, run in from a burette 25 c.c. of normal potassium or sodium hydrate, add a few drops of solution of rosolic acid, and determine the excess of ammonia with normal sulphuric acid. Each 1 c.c. of potassium hydrate solution used indicates 0.5 per cent. of formaldehyde. The ammonia combines with the formaldehyde nearly as fast as it is liberated, and the final excess is exceedingly small.

Formaldehyde as a Reagent. H. Endemann. (*Journ. Chem. Soc.*, 1898, ii. 146, 147, from *Journ. Soc. Chem. Ind.*) Substances of the phenol class combine with formaldehyde, forming colourless compounds, which become coloured on treatment with concentrated sulphuric acid. To obtain the reaction, the phenol is dissolved in commercial formalin, the solution evaporated nearly to dryness at a low temperature, and concentrated sulphuric acid added. The following reactions have been recorded:—

	The solid.	The solution.
Phenol . . .	Magenta-coloured	Magenta-coloured.
Salicylic acid .	Red	Magenta.
Eugenol . . .	Brown, with claret shade	—
Carvacrol . . .	Orange to orange-red	—
Guaiacol . . .	Violet, quickly brownish-violet	—
Resorcinol . . .	Scarlet-red	Orange.
Quinol . . .	Brown	Brown.
Thymol . . .	Faintly fawn-coloured (due to impurity ?)	—
α -Naphthol . .	Green	Brown.
β -Naphthol . .	Green, then black	Green.
Pyrogallol . .	Red	—
Hæmatein . . .	Red, then brown	—
Tannin . . .	No reaction	—

Estimation of Alcohol in Chloroform. A. Béhal and M. François. (*Journ. de Pharm.* [6], v. 424.) The chloroform is shaken with strong sulphuric acid, and the alcohol thus removed in the form of acid ethyl sulphate. The latter is decomposed by boiling the acid liquid with water, and the alcohol distilled off and estimated by oxidation to acetic acid.

Detection of Water in Alcohol and Preparation of Absolute Alcohol by means of Calcium Carbide. P. Yvon. (*Comptes Rendus*, cxxv. 1181, 1182.) When calcium carbide is added to alcohol containing water, acetylene is given off, and the resulting liquid appears cloudy on shaking owing to the formation of calcium hydrate. The carbide may also be employed for the preparation of anhydrous alcohol by adding the coarsely granulated substance in sufficient quantity to alcohol of 90 or 95 per cent., shaking occasionally during the next three hours, then allowing the mixture to stand for about twelve hours, and distilling the decanted liquid. The first portion of the distillate should be collected separately, as it contains a little dissolved acetylene; from this it may be freed by shaking with anhydrous copper sulphate and redistilling.

Detection of Water in Ether. J. Grier. (*Pharm. Journ.*, 4th series, vi. 294, 295.) For the detection of water in ether the author has experimented with carbon bisulphide and benzol, of which he finds the former to be the more delicate reagent, as it produces a turbidity with samples of ether, which remain clear with benzol. The following are the results obtained, using ether which had been freed from water and alcohol, and to which 1 per cent. by weight of water had been added :—

*Pure Anhydrous Ether + 1 per cent. by Weight of Added Water.*2 c.c. + 0.2 to 0.3 c.c. CS_2 gave turbidity.2 c.c. + 0.5 c.c. C_6H_6 gave turbidity.*Anhydrous Ether + 0.5 per cent. by Weight of Added Water.*2 c.c. + 0.9 c.c. CS_2 gave turbidity.2 c.c. + 10 c.c. C_6H_6 remained clear.*Anhydrous Ether + 0.25 per cent. by Weight of Added Water.*2 c.c. + 1.9 c.c. CS_2 gave turbidity.2 c.c. + 10 c.c. C_6H_6 remained clear.*Anhydrous Ether + 0.125 per cent. (or $\frac{1}{8}$ per cent.) of Added Water.*2 c.c. + 3.7 to 4 c.c. CS_2 gave turbidity.2 c.c. + 10 c.c. C_6H_6 remained clear.*Anhydrous Ether + 0.0625 per cent. (or $\frac{1}{16}$ per cent.) of Added Water.*

2 c.c. gave very faint turbidity with 5 to 5.5 c.c. CS_2 , which was not intensified even with 10 c.c. CS_2 , and went quite clear and bright on standing.

2 c.c. remained clear with 10 c.c. C_6H_6 .

From this it follows that carbon bisulph. scarcely detects $\frac{1}{16}$ per cent. by weight of water in ether, while benzol does not detect $\frac{1}{2}$ per cent. of water in ether. Experiments were also made with the addition of gradually increasing quantities of alcohol, and it was found that this addition of alcohol exercised a marked influence on the experiments. It was found (using 2 c.c. in each case) that the presence of about 18 per cent. by weight of alcohol made it impossible to detect the presence of 1 per cent. by weight of water in ether by means of CS_2 , while with benzol the presence of about 8 per cent. by weight of alcohol was sufficient. The results are here given:—

*Pure Ether + 1 per cent. of Added Water.*2 c.c. required 0.3 c.c. CS_2 to give turbidity.

2 c.c. + 0.1 c.c. absolute alcohol required 1.5 to 1.7 c.c. CS_2 to give turbidity.

2 c.c. + 0.2 c.c. absolute alcohol required 3.6 to 3.7 c.c. CS_2 to give turbidity.

2 c.c. + 0.3 c.c. absolute alcohol required 5.2 to 5.4 c.c. CS_2 to give turbidity.

2 c.c. + 0.4 c.c. absolute alcohol required 8.2 to 9 c.c. CS_2 to give turbidity.

2 c.c. + 0.5 c.c. absolute alcohol required 11.9 c.c. CS_2 to give turbidity.

2 c.c. + 0.6 c.c. absolute alcohol began to show temporary turbidity with 11.8 c.c. CS_2 , but no permanent turbidity even with 20 c.c. CS_2 .

Pure Ether + 1 per cent. of Added Water.

2 c.c. + 0.1 c.c. absolute alcohol required 4.6 to 4.8 or 5 c.c. of C_6H_6 to give turbidity.

2 c.c. + 0.2 c.c. absolute alcohol did not give turbidity even with 15 c.c. benzol.

A New Method for the Assay of Spirit of Nitrous Ether and of Amyl Nitrite. C. E. Smith. (*Amer. Journ. Pharm.*, 1898, 273-285.) The author's experiments have led to the adoption of the following methods:—

Valuation of Spirit of Nitrous Ether.—Into a 100 c.c. flask or bottle of white glass, provided with a loosely-fitting stopper of glass, rubber or cork, place successively 10 c.c. of distilled water, 5 c.c. of a cold, aqueous, saturated solution of potassium chlorate, 5 c.c. of the spirit to be tested, and 5 c.c. of 10 per cent. nitric acid. Quickly insert the stopper and shake frequently during thirty minutes. Then add 10 c.c. of $\frac{N}{10}$ silver nitrate, shake briskly for a moment, add 10 drops of ferric ammonium sulphate solution, and titrate the excess of silver with $\frac{N}{10}$ potassium sulphocyanate. (The titration should be performed without delay, to avoid darkening of the precipitated silver chloride by the influence of light, which interferes with the end-reaction.) The end-point is reached when, after *momentary* shaking, upon addition of the last drop of solution, the appearing red colour is not entirely dispersed, but leaves the liquid faintly reddish throughout. Assuming the spirit to contain 4 per cent. by weight of ethyl nitrite, and to have a specific gravity of 0.84, it would require 2.55 c.c. $\frac{N}{10}$ potassium sulphocyanate to precipitate the excess of silver in solution. As each cubic centimetre of $\frac{N}{10}$ silver nitrate consumed in precipitating the chloride formed corresponds to 0.0225 gramme of ethyl nitrite, the calculation is as follows:—

$$\frac{(10 - 2.55) \times 0.0225 \times 100}{5 \times 0.84} = 4.0 \text{ per cent.}$$

Concentrated nitrous ether may be assayed by diluting with alcohol in definite proportion, and then proceeding as in the foregoing process.

Valuation of Amyl Nitrite.—Partially fill a 100 c.c. graduated flask with alcohol, insert the stopper and weigh. Add five to six grammes of the amyl nitrite to be tested and weigh again. Fill

the flask to the 100 c.c. mark with alcohol and mix thoroughly by shaking. Then proceed in the same manner as directed for spirit of nitrous ether, using 20 c.c. of distilled water, 10 c.c. of the saturated solution of potassium chlorate, 10 c.c. of the alcoholic dilution of amyl nitrate and 10 c.c. of dilute nitric acid. Also use 20 c.c. of $\frac{N}{10}$ silver nitrate and titrate the excess as directed above, observing the same precautions. The calculation of results is made as explained by the following example:—Assuming the alcoholic dilution to contain 6.037 grammes of the sample in 100 c.c., the 10 c.c. taken for assay contain 0.6037 gramme. If in titrating the excess of silver, 5.45 c.c. of $\frac{N}{10}$ potassium sulphocyanate are required, $(20 - 5.45 =) 14.55$ c.c. of $\frac{N}{10}$ silver nitrate, each cubic centimetre equivalent to 0.0351 gramme of amyl nitrite, have been consumed in precipitating the chloride formed in the reaction. The calculation then is—

$$\frac{14.55 \times 0.0351 \times 100}{0.6037} = 84.6 \text{ per cent.}$$

In the application of this method care must be taken either to use pure reagents or to make allowance for the interference of impurities they may contain. Potassium chlorate and nitric acid, in their commercial forms, nearly always contain chloride, but they can readily be obtained free from it. Ammonium ferric sulphate may also contain chloride in traces. Nitric acid may contain lower oxides of nitrogen, indicated by a yellow colour of the acid and brown vapours in the air-space of the container. The correction is most readily made by mixing these reagents in the same quantities as used in the assay and allowing the mixture to stand a while. If, on the addition of a few drops of $\frac{N}{10}$ silver nitrate, only a slight opalescence appears, no correction is necessary; if the solution becomes decidedly turbid or a precipitate is formed, a known volume of silver nitrate should be added, and the excess determined with sulphocyanate. The silver nitrate required to precipitate the chloride is deducted from that required in the actual assay.

Test for Distinguishing Eucalyptol from Eucalyptus Oil and Oil of Turpentine. M. Schamelhout. (*Rep. de Pharm.*, 1897, 292). The reagent employed by the author for this purpose is a solution of bromine in chloroform. Five drops of eucalyptol produce

a greenish-yellow coloration with 4 drops of this solution, and a reddish-yellow one with 8 drops. Oil of turpentine yields no coloration, not even with as much as 250 drops of the reagent. Eucalyptus oil gives the greenish-yellow coloration with 25 drops, and the reddish-yellow one with 95 drops of the test liquid.

Detection of Resin Oil in French Oil of Turpentine. A. Aignan. (*Comptes Rendus*, cxxiv. 1367, 1368.) The author has previously pointed out that, as French oil of turpentine is lævogyre and resin oil dextrogyre, any considerable addition of the latter to the former can be at once recognised by the diminished optical rotation. He now shows that this test may be rendered much more delicate by distilling off the greater part of the sample and examining the residue. When pure oil of turpentine is distilled, the rotatory power of the successive fractions diminishes, and the same phenomenon is observed with turpentine mixed with resin oil, but in the latter case the residue left in the retort has a much lower rotation than the corresponding residue from the pure substance. Thus, when 250 c.c. of pure oil of turpentine were distilled until the residue amounted to 70 c.c., the rotation of the latter was found to be -51.5° in a 200 mm. tube, while the same quantity of residue, obtained from 250 c.c. of turpentine adulterated with 3 per cent. of resin oil, showed a rotatory power of only -36.21° . In the presence of 5 per cent. of resin oil in the sample, the rotatory power of the residue was as low as -28.6° . By conducting the distillation at 100° C. under reduced pressure, it is possible to obtain a dextrogyre residue from oil of turpentine containing only 0.5 per cent. of resin oil, whereas under the same conditions the residue from an adulterated French oil remains strongly lævogyre.

This test cannot, of course, be applied to American oil of turpentine, as this is itself dextrorotatory.

Estimation of Tannin by the Hide Powder Process. J. H. Yocum. (*Journ. Soc. Chem. Ind.*, xvi. 419, 420.) The following precautions should be observed in order to ensure uniformity and fair accuracy in the results obtained by this process. The hide powder should be freed from readily soluble substances by washing immediately before adding it to the tannin solution, a correction being made for the dilution caused by the adhering water. A mechanical means of shaking completes the tanning operation before there is time for the production of more soluble hide. The empirical method of filtration gives comparable results for the soluble solids, and the adoption of 20° as the temperature for filtration removes a source of error. The filtrate must be tested for tannin and soluble

hide; for the latter, a solution of tannin is a delicate reagent, whilst for the former a solution of gelatin in dilute alcohol is more sensitive than an aqueous solution. To prepare this, 5 grammes of gelatin are dissolved in 100 c.c. of warm water, 40 c.c. of 90 per cent. alcohol are added, and the precipitate is filtered at a temperature a few degrees below that of the atmosphere. It is of great importance that uniform quantities of hide and solutions of uniform density should be employed in the estimations. The most serious cause of discordance is that different preparations of hide powder do not give the same result.

Assay of Indigo. (*Ann. Chim. Analytic*, ii. 223. From *Pharm. Journ.*) Brandt recommends commercial aniline oil for the extraction of indigotin from indigo for the purpose of assay. The extraction is conducted in a Soxhlet apparatus until the reflux solution is colourless. The aniline extract is freely diluted with water, and a sufficiency of hydrochloric acid added to convert it into the soluble chloride, which is readily filtered off. The indigotin is collected on a tared filter, washed first with hot water, and then with a very little alcohol, and is then dried and weighed. By this method 84.25 per cent. of indigotin was obtained from Java indigo, and 67.5 per cent. from a Bombay sample.

Solubilities of Several Readily Soluble Salts. F. Mylius and R. Funk. (*Ber. der deutsch. chem. Ges.*, xxx. 1716–1725. From *Journ. Chem. Soc.*) The authors have determined the solubilities of several readily soluble salts which had hitherto not been studied. The finely divided salt was shaken with water at 18° for at least an hour, the excess of salt was allowed to subside at the same temperature, and a portion of the clear solution was removed by a pipette, weighed, and analysed.

In the Table, *A* gives the most stable form of the compound in the presence of the solution at 18°. The molecules of salts of lithium, sodium, and potassium, with monobasic acids, are doubled in order that the numbers in column *E* may be comparable, *B* gives the sp. gr. of the saturated solutions, *C* the percentage of anhydrous salt in the solution, *D* the amount of salt in grammes dissolved in 100 grammes of water, and *E* the number of molecules of water to one molecule of anhydrous salt in the solution, *F* gives the melting point of the salt of the formula given in the first column, *G* gives the number of molecules of water required to dissolve one molecule of the salt, and *H* the water of crystallisation expressed as percentage of the water required for solution,

	A.	B.	C.	D.	E.	F.	G.	H.
1	Lithium chlorate	1815	75.8	3135	3.2	125°	3.2	0
2	Calcium chlorate	1729	64	177.8	6.5	part under 100°	4.5	31
3	Lithium chromate	1571	52.6	110.9	6.7	about 185°	4.7	30
4	Zinc chlorate	1914	65	186.2	7	60°	1	87
5	Potassium fluoride	1502	48	92.3	7	about 46°	3	57
6	Calcium nitrate	1548	54.8	121.2	7.4	41°	3.4	54
7	Magnesium chlorate	1594	56.3	128.6	8.2	40°	2.2	74
8	Zinc nitrate	1664	53.9	116.9	9	36.4°	3	67
9	Strontium chlorate	1839	63.6	174.9	9.3	does not melt.	9.3	0
10	Lithium bromate	1833	60.4	133.7	9.3	"	9.8	0
11	Magnesium bromide	1655	50.8	103.4	9.9	about 165°	3.9	61
12	Magnesium iodide	1909	59.7	148	10.4	about 45°	2.4	77
13	Magnesium nitrate	1422	43.1	75.7	10.8	about 94°	4.8	56
14	Magnesium chromate	1422	42	72.3	11	part under 100°	4	64
15	Lead chlorate	1947	69.2	151.3	13.7	does not melt.	12.7	7.3
16	Sodium chromate	1409	38.1	61.4	14.6	24°	4.6	69
17	Lithium iodate	1568	41.6	80.3	25.2	does not melt.	25.2	0
18	Sodium fluoride	1044	4.3	4.4	104.8	"	105	0
19	Magnesium iodate	1678	6.44	6.88	292	"	288	1.4
20	Calcium iodate	1	0.25	0.25	863	"	862	0.7
21	Lithium fluoride	1003	0.27	0.27	1038	"	1338	0

Melting Points. J. B. Nagelvoort. (*Chemist and Druggist*, li. 235.) The author publishes the following results of a number of melting point determinations with the object of showing the desirability of a general agreement for the adoption of a uniform method of determination recognised by the entire profession :—

	Slowly melted.	Quickly melted. Zinck's thermometer.
	Degrees.	Degrees.
Acetanilid	113	100
Antipyrine	107	107
Atropine sulphate	190	195
Benzoic acid.	120	117
Caffeine	231	231
Cocaine	98	90
Cocaine hydrochloride	186	192
Codeine	150	150
Chrysarobin	151	146
Hyoscyamine	107	105
Hyoscyamine gold chloride	160	154
Phenacetin	133	123
Picric acid	120	115
Resorcin	114	106
Salicylic acid	155	155
Salicin.	191	198
Santonin	169	169
Terpine hydrate	110	114

The author comments upon several influences which induce variation.

MATERIA MEDICA AND PHARMACY.

PART II.

MATERIA MEDICA AND PHARMACY.

Rhubarb and its Adulterants. L. E. Sayre. (*Amer. Journ. Pharm.*, 1898, 129-135.) The author has made a careful study of U.S.P. official rhubarb (*Rheum officinale* and *R. palmatum*), and compared it with *R. rhaponticum* and *Rumex hymenosepalus*. Thin sections of the first showed that the lighter-coloured ground tissue was composed of thin-walled parenchyma, while the dark and contorted areas were principally fibro-vascular tissue, which was sometimes in regularly arranged spots having a radiate structure. In *R. rhaponticum* the parenchyma was also thin-walled, but there was a distinct and plainly-marked radiate structure, unbroken by such an arrangement of vascular tissue as described above. Starch grains, calcium oxalate crystals, and massed acicular crystals of chrysophanic acid were prominent in both specimens. Sections of canaigre root were totally different from those of rhubarb. Thin-walled parenchyma occupied the whole extent of the sections, being marked off into two areas by a concentric cambium line, and the central area occupied about two-thirds the diameter of the sections. About a dozen groups of vessels radiated from the centre to the cambium. When powdered, the two rhubarbs could not be distinguished, and the starch of canaigre was the only diagnostic feature that could be relied upon to differentiate that root in the state of powder. The grains are described as being long and slender in form, and exhibiting a long, branching hilum, which extends throughout the major portion of the long diameter. But while official rhubarb powder turns a dark, brick-red colour with ammonium hydrate, the powder of *R. rhaponticum* exhibits a distinctly salmon-red shade, whilst canaigre gives a brownish colour. This test, however, also fails in dealing with mixed powders.

Detection of Turmeric as an Adulterant in Powdered Rhubarb Root. A. Jaworowsky. (*Pharm. Zeitschr. für Russl.*, 1897,

543.) 1 gramme of the finely powdered rhubarb is shaken for a few minutes with 10 c.c. of chloroform, and the mixture is then filtered. The filtrate is agitated with 15 times its volume of petroleum ether and the mixture divided into 2 parts, one of which is shaken once or twice with 2-3 c.c. of pure strong sulphuric acid, while the other is shaken with 1-1.5 c.c. of saturated solution of borax. If the sample was pure, the original chloroform solution will show a pale, straw-yellow colour, which disappears on mixing with the petroleum ether. The treatment with sulphuric acid will impart a pale brown colour to the latter, while the supernatant liquid remains colourless. The treatment of the second portion with strong borax solution should produce no change in colour. If, however, the sample under examination was adulterated with turmeric, the following reactions will be obtained:—The chloroform solution will show a yellowish-brown colour and a well-marked greenish fluorescence. The addition of petroleum ether will cause the formation of a yellow flocculent precipitate in the chloroform solution, while the yellow colour of the liquid and the green fluorescence remain unchanged. The mixture of chloroform solution and petroleum ether, when shaken with sulphuric acid as stated, will change to violet, while the acid itself will assume an intense red coloration, changing rapidly to reddish-brown and then slowly to yellowish-brown. The agitation of the second portion with borax solution will cause the latter to turn violet, the upper layer remaining unchanged. These reactions are stated to be very delicate.

A New False Ipecacuanha. M. G. Dethan. (*Pharm. Journ.*, 4th series, vi. 324, from *Journ. de Pharm. d'Anvers.*) The author describes two roots which he has found mixed with ipecacuanha, one of which he has identified as that of *Polygala violacea*. The lower part of the root bears a considerable resemblance to that of undulated ipecacuanha (*Richardsonia brasiliensis*), whilst the upper pieces are striated like those of the *Psychotria emetica*. The *P. violacea* has a creeping root of a deep brown colour rather thicker than a goose quill, and 10 to 20 cm. long, becoming thinner towards the extremity. It is coarsely striated, and the fracture is whitish and starchy. The root branches, which are numerous, have a yellowish colour, are more or less twisted and smooth and have an amylaceous fracture, the bark is frequently cracked transversely so as to expose the central cylinder. The roots differ, however, from those of *Richardsonia* in being dichotomously branched. The stem of *Psychotria* is dark brown and

smooth, and nearly as large as the root, but that of *Polygala violacea* is paler, yellowish, and rugose, and is more slender than the root. The cork is composed of four to eight layers of elongated cells, filled with a brownish colouring matter. The cortical parenchyma consists of large elongated cells, becoming shorter and more rounded towards the centre of the root. These cells are filled with densely crowded starch grains of a more or less spherical form. The woody cylinder exhibits numerous vessels, generally isolated, but rarely in groups of two or three, and scarcely varying in size. The centre of the root is occupied by a group of the vessels. The medullary rays consist of a single series of cells. The thickness of the bark generally equals that of the wood. There are no raphides present in the root, although maces or cluster crystals are present in the stem, both in the cortical parenchyma and in the pith, diminishing in numbers as it approaches the root. The leaves when present have a plano-convex midrib, and are seen to be furnished with unicellular hairs, with a swollen base immersed in the epidermis and filled with a yellowish resinous matter. The stem has two or three rows of pericyclic fibres surrounding the central cylinder in a nearly continuous ring, which, however, ultimately splits up into isolated groups. The absence of raphides distinguishes it from *Psychotria*, *Richardsonia* and *ipecacuanha*; the vessels also from the last, and the colour of the roots from the first two.

Histology of Veratrums. R. H. Denniston. (*Pharm. Archives*, i. 68. From *Journ. Chem. Soc.*) The author has endeavoured to distinguish the powdered rhizome of *Veratrum album* from that of *Veratrum viride*, but although certain reactions were found to distinguish the powders when separate, the difference, being mainly one of intensity, proved to be of practically no value when the powders were mixed. The structure of the two rhizomes is identical in almost every detail, whether viewed in transverse or longitudinal sections, and such slight differences as are apparent at times are not constant. In the root structure, however, greater differences are found. Directly beneath the epidermis in *V. viride* there are but two or three rows of large, irregular, distorted collenchymatous cells; in *V. album* the collenchyma consists of seven or eight rows of rounded, thicker-walled, and smaller cells, which are not distorted in the least. As a rule the whole cortical region in *V. album* consists of smaller and more regular cells than in *V. viride*, and in the central bundles of the former there are usually found a somewhat larger number of

wood rays, whose largest tracheæ do not approach the size of those of *V. viride*. But when the drugs are powdered these differences in root structure are valueless in helping identification, as the roots of *V. album* are usually removed before powdering. The form and size of the starch grains do not differ essentially in the two rhizomes, and raphides are equally abundant in the parenchyma cells of both. The use of alkaloidal reagents was next resorted to, and in every instance the powder of *V. album* showed a deeper colour than that of *V. viride*, as was to be expected when the great preponderance of alkaloids in the former is considered. Concentrated sulphuric acid gave a brick-red colour with *V. album*, and an orange-red with *V. viride*, but neither this nor any other test tried was of any use in the case of mixed powders.

Constituents of the Root of Helleborus Niger. K. Thaeter. (*Archiv der Pharm.*, ccxxxv. 414-424.) The author reports on the two glucosides "helleborein" and "helleborin." Of these, the former is easily soluble in water, but insoluble in ether, and the latter is insoluble in water but soluble in ether. Helleborein is obtained from the aqueous extract by preparing from it the tannin compound of the glucoside and treating this with lead hydrate, which liberates the glucoside; this is purified by repeated solution in absolute alcohol, and precipitation by ether. From a solution in 96 per cent. alcohol, only a yellow, amorphous, very hygroscopic mass separates, but from absolute alcohol fine needles are obtained which, although not as hygroscopic as Husemann and Marmé's preparation, have the same physical properties. The author's analysis, however, indicates the empirical formula $C_{37}H_{56}O_{18}$, and the analysis of the blue product, which Husemann and Marmé named "helleboretin," corresponds with the formula $C_{19}H_{30}O_5$; this can be obtained from helleborein by the action of dilute hydrochloric or sulphuric acid, dextrose and acetic acid being also formed. With concentrated nitric acid, helleboretin gives an intensely violet solution, which deposits violet flakes on pouring it into water and allowing it to stand. Neither dilute nor concentrated nitric acid gives any coloration with helleborein, and no helleboretin is formed.

Husemann and Marmé's method of preparing helleborin did not prove successful, but the author obtained it from the ethereal extract by treating it with light petroleum to remove the fatty compounds, and then with acetone, which dissolves tarry and colouring matters. The residual helleborin can be purified by crystallisation from a mixture of ether and alcohol, and is then

pure white; in its physical properties it agrees with those of Husemann and Marmé's preparation, and gives the characteristic violet-red coloration with concentrated sulphuric acid, but the author's analysis indicates the empirical formula $C_6H_{10}O$.

Alkaloid-Assay of White Hellebore. C. H. La Wall. (*Amer. Journ. Pharm.*, 1897, 351, 352.) The author has applied Keller's well-known general assay process to the estimation of the alkaloids in white hellebore and has found it to give satisfactory results. Five commercial samples of the drug were examined and gave the following results:—No. 1, 1.20 per cent.; No. 2, 1.24 per cent.; No. 3, 1.25 per cent.; No. 4, 1.12 per cent.; No. 5, 1.18 per cent. of total alkaloids. From these results the author concludes that the commercial drug is fairly uniform in strength, and that about 1 per cent. might be a fair limit for the minimum allowable yield of alkaloids by this process.

Active Constituents of Arum. J. Chauliaguet, A. Hébert and F. Heim. (*Comptes Rendus*, cxxiv. 1368-1370.) The authors have investigated *Arum maculatum* and *A. italicum* and have isolated from them a glucoside and a liquid volatile alkaloid, both possessing toxic properties. The glucoside is a saponin, and produces effects similar to sapotoxin but somewhat feebler; it does not destroy the irritability of nerves and muscular striæ, and has scarcely any action on the heart. The alkaloid is a brownish, volatile, unstable liquid, only slightly soluble in water, but soluble in all ordinary organic solvents, and has a strong mice-like odour. It fumes with hydrochloric acid, yields a hydrochloride crystallising in deliquescent needles, and agrees with coniine in nearly all its characters. It is, however, less potent than the latter in its *physiological* action. A similar alkaloid also occurs, together with saponin, in *Arisarum vulgare*, *Caladium bulbosum*, and *Amorphophallus Rivieri*.

A search for hydrocyanic acid in the plants named gave negative results.

Asarum Canadense. H. Kraemer. (*Amer. Journ. Pharm.*, 1898, 145-152.) The author gives illustrations of the wild ginger or *Asarum canadense*, and a plant that has been confounded with it, which was separated as a distinct species under the name of *Asarum reflexum* by E. P. Bicknell in November, 1897. The species differs chiefly in the shape of the flowers. In *A. canadense* the calyx lobes are spreading, passing gradually into a slender up-curved acumen, and the interior of the calyx tube is purple down to the base, but in the *A. reflexum* the lobes reflexed and abruptly

acuminate into a straight obtuse point, the calyx tube being white within. The *A. canadense* prefers rich hilly woods, often in rocky situations, and the *A. reflexum* low woods along streams or river valleys, often forming extensive beds, rarely in upland woods. It is not yet ascertained which species yields the wild ginger rhizome of commerce, nor whether the rhizomes differ in anatomical structure.

Alkanet Root. E. M. Holmes. (*Pharm. Journ.*, 4th series, v. 61, 62.) The author gives a description and woodcut illustration of a cultivated specimen of *Alkanna tinctoria*, the chief source of the alkanet root of commerce. For particulars, reference should be made to the original paper, which also contains notes on *Arnebia thibetana*, *A. tinctoria*, *Lithospermum erythrorhizon*, *Macrotomia benthami*, *M. perennis*, *Onosma emodi* and *O. hookeri*, all of which yield red roots, known to be used like alkanet.

Saponaria Rubra. W. von Schulz. (*Pharm. Zeitschr. für Russl.*, xxxv. 817-853.) The root of *Saponaria rubra* contains 3.45 per cent. of the active principle "saporubrin," which was first isolated by Kobert and Pachtorukow. This substance should not be confounded with the sapotoxin of quillaia bark, which it closely resembles. It appears to be a methylsapotoxin analogous to the sapotoxins of *Agrostemma*, quillaia, *Sapindus* and *Saponaria alba*. An injection into the veins of dogs and cats of 2 milligrammes of saporubrin per kilogramme of body weight causes death. Taken internally, it causes vomiting; on being injected, it produces rapid nervous and muscular paralysis. It shows the property characteristic of the saponins of dissolving the red blood-corpuscles.

Saporubrin is an amorphous powder, with a neutral reaction, and a taste which is at first cool, but becomes burning. Its aqueous solution gives a lather, and evolves carbonic anhydride; it is sparingly soluble in alcohol, but insoluble in the ordinary organic solvents. Concentrated sulphuric acid produces a reddish-brown coloration, which changes in the air, or on the addition of a drop of water, to a reddish-violet; this becomes emerald-green on adding potassium bichromate. Ferric chloride and alcoholic sulphuric acid produce a greenish-blue coloration. Barium hydrate gives a white precipitate insoluble in water. Saporubrin rapidly reduces solutions of potassium permanganate and silver nitrate. It is optically active: $[\alpha]_D = -5.44$. Its composition is expressed by the formula $(C_{18}H_{28}O_{10})_4$.

Hydrastis Canadensis in Bronchitis. (*Med. Press*, cxiv. 514, and *Chemist and Druggist*, lii. 880.) The action of hydrastis as

an expectorant in bronchitis is very favourably reported upon by Saenger, who considers this drug superior to any other remedy of this class. It is given in doses of 20 to 30 drops of the fluid extract, and is stated to combine the properties of a sedative with those of an expectorant. Its sedative effects are found to be somewhat less prompt but more lasting than those of opium.

Cyclea Peltata. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 692.) The root and leaves of this Menispermaceous plant are used as a remedy for abdominal complaints. Boorsma isolated from the root 2·5 per cent. of a very bitter, uncrystallisable alkaloid, for which he proposed the name "cycloine." This constituent is stated to agree in many respects with buxine.

Arrow-Root, Cassava and Koonti. A. T. Cuzner. (*Amer. Journ. Pharm.*, 1898, 212-214.) The author, after considering the respective merits of arrow-root and cassava as sources of food, gives an account of the third member of the group.

The koonti plant (*Zamia integrifolia*) is a native of South Florida, and is known as "Indian Bread Root." In its foliage it bears a resemblance to the palm and tree fern. In affinity it is nearer the latter than the former. Its root is the edible portion. In order to make the koonti flour, the roots are gathered, the earth is washed from them, and they are then reduced to a kind of pulp by chopping them into small pieces and pounding them in wooden mortars by means of wooden pestles. When a sufficient quantity of the roots has been pounded, the whole mass is thoroughly saturated with water in vessels made of bark; the pulp is then mashed in a straining cloth, the starch draining into deer hides suspended below. When the starch has been thoroughly washed from the mass, the latter is thrown away, and the starchy sediment in the water left to macerate. After some days the sediment is removed from the water and spread upon palmetto leaves to dry. When dried, it is a yellowish white flour ready for use. The bread made from it is of an orange yellow colour, and is rather insipid though not unpleasant to the taste.

Constituents of Marsh Mallow Root (*Althæa Officinalis*). N. A. Orloff. (*Pharm. Zeitschr. für Russl.*, xxxvi. 631.) The roots were extracted several times with water, the extracts being finally evaporated, precipitated with basic lead acetate, and the excess of lead removed by sulphuretted hydrogen. The fluid was then evaporated to a small volume and set aside for some days to allow the asparagine to crystallise out. The solution was next drawn off, the crystals washed with weak alcohol, and the united fluids

mixed with a solution of mercuric nitrate after the distillation of the alcohol. This precipitated the rest of the asparagine. The filtrate was then treated with sulphuretted hydrogen, evaporated, acidulated with nitric acid and, after adding a solution of sodium phospho-molybdate, set aside for two days. The precipitate was then collected on the filter, washed with very dilute sulphuric acid, mixed with aqueous barium hydrate solution, the solution filtered, freed from the excess of barium by carbonic acid, evaporated to dryness, and the residue extracted with alcohol. After extraction, a yellowish crystalline substance remained, which formed colourless crystals on being recrystallised from alcohol or water with animal charcoal. The substance thus obtained was soluble in water or alcohol, and precipitated by ether from the alcohol solution. It contained nitrogen. The alcoholic solution of the free base, treated with alcoholic chloride of zinc solution, gave a precipitate, the volume of which increased on standing. The base gave all the characteristic reactions of betaine.

Constituents of the Corm of *Cyclamen Europæum*. B. Rayman. (*Chem. Centr.*, 1897, 230, 231.) Cyclamose and cyclamin are obtained from the corm by extracting it with 70 per cent. alcohol, and may be separated by means of absolute alcohol in which the latter is soluble. *Cyclamin*, $C_{27}H_{38}O_{13}$, which is purified by precipitating it from a concentrated aqueous solution by ether, gives a dark red coloration with fuming sulphuric acid; the aqueous solution froths like that of saponin, but is more easily decomposed by acids or by boiling. By the action of sulphuric acid, it is decomposed into cyclamiretin, $C_{14}H_{18}O_2$, levulose, and a dextrorotatory sugar, *cyclose*. Cyclamose, $C_{36}H_{62}O_{31}$, which the author proposes to name *cyclamosin*, is a white, amorphous powder, has a sweetish taste, deliquesces, and becomes black on exposure to the air, and with hydrochloric acid yields levulose. No mannitol could be detected. The residue left after extracting with alcohol consists of starch and cellulose.

***Aralia Nudicaulis*.** W. C. Alpers and B. L. Murray. (*Amer. Journ. Pharm.*, 1897, 534-543.) This paper, which was read before the American Pharmaceutical Association, deals with the botany, microscopy, and chemistry of this plant, as well as with the pharmaceutical preparations of its rhizome. The structural description is accompanied by a number of woodcut illustrations.

As a summary of the systematic analysis and estimation of the constituents, the following table is presented :—

Extract with	Percent- age of Dry Drug.	Containing
Chloroform . . .	3.38	Resin, 3.05 per cent. ; oil, 0.33 per cent.
Alcohol, 80 per cent.	8.75	Tannin ; organic acid ; acid resin (neutral resin ?)
Water	3.58	Albuminous bodies ; colouring matter.
Acid $\frac{1}{2}$, water $\frac{1}{2}$. . .	56.10	Mucilaginous matter.
Alkaline solution . . .	6.89	Crude fibres, etc.
(By subtraction). . .	21.30	Cellulose.
	100.00	

Regarding pharmaceutical preparations, a quantity of the fresh rhizome gathered in the fall was digested with alcohol, according to the directions of the U.S. Pharmacopœia for making fresh tinctures. This tincture, after standing nearly a year, exposed to the varying temperatures of winter and summer, showed no precipitate, and possessed the odour and taste of the plant. Mixed with water it formed a milky precipitate, indicating the presence of oil and resin. It had a beautiful gold-yellow colour, which seemed to be permanent. A fluid extract was prepared from the rhizome gathered in the spring. A menstruum of four parts of alcohol and one of water was used, and the general directions of the Pharmacopœia for making fluid extracts were followed. The evaporation of the second percolate was performed at a very low temperature, in order not to drive off oily or resinous parts. The fluid extract resembled the tincture, but was darker, owing to the solution of the colouring matter of the plant, and more aromatic.

Although this fluid extract appears to be an elegant and highly concentrated preparation, and to possess all the properties of the drug, it is doubtful, in the authors' opinion, if therapeutically it would be the most desirable form of administering the drug. The virtues of the drug appear to depend on the oil and resins. The properties of the drug, judging from some crude experiments, seemed to be stimulant, diaphoretic, and probably neurotic.

Analysis of the Root of *Kalmia Latifolia*. H. Matusow. (*Amer. Journ. Pharm.*, 1897, 341-343.) This plant is a well-known evergreen shrub of the order *Ericaceæ*, inhabiting nearly all parts of the United States, where it is known under the synonyms of mountain laurel, broad-leaved laurel, calico bush, and spoon wood. The leaves have been previously investigated, and shown to possess poisonous properties due to "andromedotoxin." The author has now made an analysis of the root, and has obtained

evidence of the presence therein of the same principle (andromedotoxin). The other constituents found by him were starch, 11·4 per cent.; cellulose, 47·4 per cent.; lignin, 20·2 per cent.; moisture, 5·0 per cent.; ash, 1·2 per cent.; tannin, similar to oak-tannin; phlobaphene, pararabin, mucilage, albuminous matters, resin, wax, and caoutchouc. Tests for alkaloids and glucosides gave negative results.

Spigelia Anthelmintica. (*Pharm. Zeitung*, xlii. 678.) This plant has yielded to Boorsma a toxic alkaloid, which he proposes to call *spigeleine*. It is obtained as a pale yellowish, soft and hygroscopic varnish by adding ammonia to the alcoholic extract and shaking repeatedly with chloroform, which takes up the alkaloid. It has a paralysing action on the nerve centres, but produces no titanic spasms, and is fatal to guinea pigs in doses of 0·5 milligramme. It is essentially different in its action to both strychnine and gelsemine. Attempts to crystallise this alkaloid were unsuccessful. It is insoluble in water, ether, carbon bisulphide, and petroleum ether, and does not give any characteristic colour reactions.

Composition of the Root of Baptisia Tinctoria. K. Gorter. (*Archiv der Pharm.*, cccxxv. 301-320, and 494-503; *Journ. Chem. Soc.*, 1897, 627, 628, and 1898, 39, 40.) Baptisin can be extracted from the dried root by means of hot 60 per cent. alcohol, the extract, on evaporation, treatment with sodium hydrate solution, and shaking with chloroform, yielding large quantities of a white, crystalline substance from which the glucoside can be readily obtained pure by recrystallisation from dilute alcohol. On extraction with chloroform, the alkaline filtrate yielded only small quantities of the alkaloid, but on acidifying the extracted liquid and precipitating with tannin, a second glucoside, *baptin*, was obtained melting at 188-189° after recrystallisation from alcohol. The alkaloid, *baptitoxine* (cytisine), was obtained from the root, which had previously been extracted with alcohol, by treatment with dilute hydrochloric acid.

Anhydrous *baptisin*, $C_{26}H_{32}O_{14}$, melts at 240° (uncorr.), and is lævorotatory $[\alpha]_D = -61^{\circ} 40'$; it crystallises with $9H_2O$ from dilute alcohol, and on boiling with 16 per cent. sulphuric acid is split up into *baptigenin*, $C_{14}H_{12}O_6$, and rhamnose (isodulcitol); the former crystallises from dilute alcohol in white needles, which become brown at 250° without melting.

Baptitoxine (identical with cytisine) is present in the root in

very small quantity, and may be extracted from it by means of dilute hydrochloric acid as stated above.

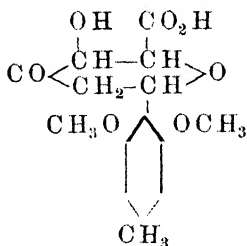
ψ-Baptisin, $C_{27}H_{30}O_{14}$, is obtained from Merck's baptisin by crystallisation first from dilute alcohol, then from hot water, and finally from dilute spirit. It crystallises in colourless needles, is tasteless, and contains neither nitrogen nor water. It melts at $247-248^{\circ}$, is soluble in boiling water, alcohol of 50 per cent. or acetone, very soluble in methylic alcohol, but insoluble in cold water, ether, acetone, benzene, chloroform, and dilute spirit, the specific rotatory power $[\alpha]_D = -101^{\circ} 40'$. With sulphuric acid, it gives a yellowish-brown coloration passing into orange-red; with Erdmann's reagent a very fugitive green coloration passing through reddish-violet to reddish-brown, and becoming green on addition of water; with a solution of iodic acid in concentrated sulphuric acid, it gives successively violet, red, olive-green, and yellow colorations. Millon's reagent produces a pale red coloration on boiling, and ferric chloride colours a solution in methylic alcohol yellowish-brown. It does not reduce Fehling's solution even on boiling with it for a short time, but reduction takes place with ease after it has been treated with sulphuric acid. From dilute alcohol, it crystallises with $7\frac{1}{2} H_2O$ or $4 H_2O$, and, after drying over sulphuric acid, it contains $1\frac{1}{2} H_2O$, which may be driven off at $125-130^{\circ}$, the substance becoming slightly yellow.

By boiling *ψ*-baptisin with dilute sulphuric acid, *ψ-baptigenin*, $C_{15}H_{10}O_5$, glucose, and rhamnose are formed. The first is a white, crystalline compound, does not melt below 270° , is insoluble in cold water, acetone, methylic and ethylic alcohols, but soluble in hot acetone and hot methylic alcohol.

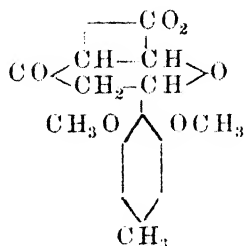
The Constituents of Indian and American Podophyllum. W. R. Dunstan and T. A. Henry. (*Proc. Chem. Soc.*, 1898, No. 189.) The authors find that the constituents of Indian podophyllum (*Podophyllum emodi*) and of American podophyllum (*Podophyllum peltatum*) are identical. The chief constituent is the *podophyllotoxin* of Podwyssozki and Kürsten which the authors have fully examined. It is a neutral crystalline substance (m.p. 117°), to which the authors assign the formula $C_{15}H_{14}O_6$. It is strongly levorotatory, and acts as a powerful purgative and intestinal irritant. When heated with alkalis, it is converted by hydration into the salt of an unstable, gelatinous acid, *podophyllic acid*, $C_{15}H_{16}O_7$, of which a crystalline sodium salt was obtained, and also silver and copper salts, which were analysed. This acid very readily loses water, and furnishes the crystalline *picropodophyllin*

of Podwyssozki and Kürsten, which is isomeric with podophyllotoxin. It passes again into podophyllic acid when warmed with aqueous alkalis. It melts at 227° , and is optically inactive. Podophyllotoxin and picropodophyllin furnish identical decomposition products; when oxidised with nitric acid, *oxalic acid* is the principal product; when fused with alkalis, *orcinol* and *acetic acid* are produced. Both substances contain two methoxyl groups and no hydroxyl. It is concluded that picropodophyllin is the lactone of podophyllic acid, which is probably the hydroxy-carboxylic acid of *dimethoxymethyl-phenylhydro- γ -pyrone*.

The following formulæ are assigned to these compounds:—



Podophyllic acid.



Picropodophyllin.

The nature of the isomerism of podophyllotoxin and picropodophyllin remains to be determined. The latter substance is therapeutically inert.

The yellow colouring matter of podophyllum, called by Podwyssozki podophylloquercetin, is proved by the authors to be identical with *quercetin*, the valuable yellow colouring matter of quercitron bark.

An uncrystallisable resin, *podophylloresin*, was also isolated and found to exert a purgative action.

Estimations have been made of the amount of "podophyllin" (a mixture of resins with podophyllotoxin which is used in medicine) contained in the two plants. Indian podophyllum contains from 9 to 12 per cent., and American from 4 to 5 per cent. The two resins have been proved to be equally valuable therapeutic agents. The amount of crystalline podophyllotoxin in the Indian plant varies from 2 to 5 per cent., whilst representative samples of the American rhizome were found to contain rather less than 1 per cent.

Indian podophyllum is likely to be valuable both as a drug and as a dye-stuff.

Constituents of Male-Fern. R. Boehm. (*Ann. de Pharm.*, iii. 283.) Compare *Year-Book of Pharmacy*, 1897, 211. The author supplies some further particulars respecting the principles isolated by him from male-fern, *Aspidium filix mas*. *Aspidin*, $C_{23}H_{28}O_7$, forms yellowish prisms melting at 124.5° C. *Albaspidin*, $C_{22}H_{28}O_7$, crystallises in colourless needles melting at 148° C. *Flaraspidic Acid*, $C_{23}H_{28}O_8$, yields golden yellow prisms insoluble in water. *Aspidinin* forms colourless rhombic plates melting at 110° C., and *Aspidinol*, $C_{12}H_{26}O_4$, long needles or rhombic prisms melting at 143° C.

Assay of Male-Fern and its Preparations. G. Daccomo and L. Scoccianti. (*Journ. de Pharm.* [6], v. 61, 62.) The authors effect the estimation of filicic acid by extracting the rhizome or its extract with pure ether, and agitating the ethereal liquid with a solution of copper acetate. The precipitated copper filicate is collected, washed with water and alcohol, dried at 100° , and weighed. Ether free from alcohol should be employed in the process, as the presence of even small quantities of the latter lowers the solubility of the filicic acid.

Alkaloidal Constituents of Cascarilla Bark. W. A. H. Naylor. (*Pharm. Journ.*, 4th series, vi. 279.) The author's investigation was undertaken with the object of confirming or disproving Boehm's statement that this bark contains an alkaloid closely allied to choline (abstract, *Year-Book of Pharmacy*, 1886, 168).

Fourteen pounds of bark reduced to No. 40 powder were exhausted by percolation with chloroform water containing 3 per cent. of oxalic acid. The percolate was made faintly alkaline by ammonia, evaporated at a low temperature to one-fifth of its volume, allowed to become cold, and filtered from the crystallised magma which had separated out. The filtrate was precipitated by an excess of lead acetate and the precipitate collected on a calico filter and well washed. After removal of the excess of lead by the addition of sulphuric acid the clear liquor from the lead sulphate was rendered faintly alkaline by ammonia and agitated with three successive portions of ether to withdraw the cascarillin that should be present. The same liquid was next shaken in a like manner with chloroform. The chloroformic residue was put aside for separate examination (see below). After removal of the chloroform, the liquid was acidulated with sulphuric acid and treated with Thresh's reagent in sufficient quantity to effect complete precipitation. The precipitate, after being washed on a filter until quite free from free iodine, ammonium, or potassium salts, was decomposed

by freshly precipitated silver carbonate in the presence of water and filtered. The filtrate was faintly acidulated with hydrochloric acid and evaporated over a water bath and again filtered. This final filtrate was precipitated by platinic chloride, and the precipitate collected and thoroughly drained. The double compound of base and platinum salt was repeatedly crystallised from water and finally washed with absolute alcohol.

The purified platinochloride, when dried at 105° C. and ignited, left 30.16 per cent. of platinum (mean of three determinations). A portion of the platinum salt was converted into the chloride of the base; this salt was obtained in minute white crystals, which, when perfectly dry, were practically insoluble in alcohol. When heated, the chloride melted with intumescence, and gave off trimethylamine. The evolution of the latter indicates that the base in question is allied to choline; while the insolubility of the chloride in alcohol, its melting with intumescence, and the analytical results obtained with the platinochloride, demonstrate that the base is not choline, but betaine.

Examination of the chloroform residue. This residue (see above) was treated with warm 3 per cent. hydrochloric acid, the filtered solution rendered alkaline with ammonia, and then shaken with chloroform. After evaporation of the chloroform the residue was taken up with the weak acid, and, after the addition of ammonia, was again shaken with chloroform. The product, which was not quite free from colour, was alkaline and soluble in alcohol, ether, and chloroform. It contained nitrogen. A solution of a portion of it in weak acid was precipitated by ammonia, also by iodine and potassium iodide, Mayer's reagent, Thresh's reagent, cadmium and potassium iodide, and phosphomolybdate of sodium. To the solution of another portion in weak acid the addition of platinic chloride gave a buff-coloured precipitate, which was collected and washed free from platinum chloride. When air-dried it was soluble in alcohol and crystallised from hot water in prismatic plates. This alkaloidal substance was also obtained from the impure cascarillin yielded by Alessandri's process. The existence of a base in cascarilla bark other than one allied to choline has been a debatable point, but may now be accepted as a fact. It is believed that this is the first time that the alkaloid cascarilline has been isolated and its platinum compound prepared.

Rhamnus Frangula Bark. E. Aweng. (*Journ. der Pharm. Els.-Lothr.*, 1897, 183.) The author refers to the constituents of this bark, viz., emodin, frangulin, chrysophan, and the so-called

frangulic acid isolated by Kubly, and stated by him to yield a glucoside on purification. He regards the "pure frangulic acid" of Kubly as a decomposition product, which he terms pseudo-frangulin, and speaks of the original crude acid of that author as the "primary glucoside." When hydrolysed, pseudo-frangulin furnishes pseudo-emodin. Both these have a slight purgative action. The emetic action of the green bark is attributed to a hydrolytic ferment, which is destroyed by heating. In preparing the fluid extract of *Rhamnus frangula*, Aweng suggests that the glucosides should be hydrolysed by heating with citric acid solution, evaporating to dryness, and then extracting with alcohol of 96 per cent. The citric acid may be removed, if desired.

Ceriops Candolleana. H. Trimble. (*Amer. Journ. Pharm.*, 1897, 505, 506.) The author has examined two samples of the bark of this member of the mangrove group, which had been collected in widely separated localities in India, his chief object being to investigate the nature of its leading constituent, tannin. One sample was received from Bengal, and was collected in February; the other was sent from Singapore, and was collected there in November.

Ceriops Candolleana, like many other members of the Rhizophoraceæ, is found in nearly all the low muddy shores of India, and the Andaman Islands. It is known under the vernacular names of Kurrari, Gorán, Madá, and Tengah, according to the locality in which it grows. It is a small, evergreen tree, with dark red bark and hard red wood. The pores of the wood are very small, and the medullary rays very fine, slightly wavy and equidistant. The pores are joined by fine, wavy, interrupted, concentric bands.

The bark is of a deep reddish-brown colour, and is covered on the outer surface with numerous conspicuous lenticels. It imparts a deep port wine colour to water, and contains large quantities of both colouring matter and tannin. On these two substances depends the use of the bark for both dyeing and tanning.

Each of the two samples yielded the following percentages of moisture, ash, and tannin:—

	Moisture.	Ash in absolutely dry sample.	Tannin in original sample.	Tannin in absolutely dry sample.
Sample from Bengal . .	13.70	5.83	27.24	31.56
Sample from Singapore .	13.34	10.60	20.00	23.07

The author has isolated the tannin, and investigated its composition and reactions. His results show it to belong to the class of oak bark tannins.

Prunus Virginiana. G. E. Cooley. (*Journ. Pharmacol.*, iv. 168.) The author has examined samples of the bark of this plant collected at different seasons. He finds that the bark collected in summer or winter contains little or no starch, whereas notable quantities of this substance occur in that collected in autumn and spring. The starch reaches its maximum in October, and after that it appears to be most abundant in April. The amount of tannin is appreciably greater in the spring bark than in that collected in the autumn.

Periploca Græca. E. Lehmann. (*Archiv der Pharm.*, cccxxv. 157-176.) Compare also *Year-Book of Pharmacy*, 1897, 150. The author, in conjunction with M. Burshinsky, has previously reported the isolation from the bark of this plant of a bitter glucoside, *periplocin*, possessing the characters of a cardiac poison similar in its action to digitalin, strophanthin, and ouabain. He now supplies some further information respecting the characters of this constituent, and a full description of the methods employed for its isolation. Periplocin, $C_{30}H_{48}O_{12}$, crystallises in long, thin, colourless, transparent needles, melting at $205^{\circ}C.$ to a yellowish, transparent, viscous mass, and decomposing at 215° . It is readily soluble in ethyl and amyl alcohols, slightly soluble in cold water, rather less soluble in hot water, and almost insoluble in ether, chloroform, benzene, and petroleum spirit. The specific rotatory power is $[\alpha]_D = +20^{\circ}$. Its colour reactions and behaviour with various reagents are described in detail. On heating the glucoside with dilute sulphuric acid, *periplogenin*, $C_{21}H_{31}O_5$, is obtained, together with a sugar which reduces Fehling's solution, but seems not to be identical with glucose. Periplogenin is readily soluble in alcohol and chloroform, less so in ether, only very sparingly soluble in water, and insoluble in benzene and petroleum spirit. It crystallises in stellate groups of long prisms, melting at $185^{\circ}C.$ to a colourless liquid, and decomposing at 200° . Its specific rotatory power is $[\alpha]_D = +30^{\circ}$. On oxidation with nitric acid both periplocin and periplogenin yield a substance apparently analogous to trinitrophenol.

The author has not yet succeeded in isolating the odoriferous principle contained in the bark.

Juglans Cinerea and Juglans Nigra. G. E. Cooley. (*Journ. Pharmacol.*, iv. 195. From *Pharm. Journ.*) The inner bark of

the root of *Juglans cinerea* is official in the United States Pharmacopœia, and an attempt to distinguish the powdered bark from that of *J. nigra* has been made by the author, acting under the direction of a research committee of the revision of the U.S.P. Transverse sections of the two barks revealed a similar distribution of the hard bast through the softer tissues, in much interrupted bands of fibres. In vertical sections, particularly in radial ones, rows of parenchymatous cells are seen accompanying the strands of long bast fibres which occur in both species. In *J. cinerea* each of these cells contains a cluster crystal of calcium oxalate, but this is never the case in *J. nigra*, the cells of which contain single kline-rhomboidal crystals only. Cluster crystals occur in both species, in cells scattered through the soft bast, but the kline-rhomboidal crystals associated with the fibres are characteristic of *J. nigra*. An examination of coarse powders of the two barks shows that the characteristic crystals in each case still cling to fragments of the bast fibres, and afford a ready means of distinction. In finer powders the kline-rhomboidal crystals are not often found in connection with the cell tissue, but they are seen scattered in abundance over the slide when examined under the microscope. These crystals are very numerous and easily seen in the powdered root-bark of *J. nigra*, however fine the powder may be. To exclude the stem-bark of *J. cinerea*, it is suggested that the powder should contain no bast fibres of diameter so great as 0.05 in., and rarely any with a diameter greater than 0.001 in. Finally, unless the powder gives, immediately, a bluish (not greenish) black coloration with a 1 per cent. solution of ferric chloride, it should be rejected as having been prepared from bark not collected at the proper season of the year.

Retama Sphærocarpa. J. A. Battandier and T. Malosse. (*Comptes Rendus*, cxxv. 360-362.) The authors have extracted from the young shoots and bark of *Retama sphærocarpa* a new alkaloid, *retamine*, which they regard as a hydroxysparteine, $C_{15}H_{26}N_2O$. It crystallises from petroleum spirit in long needles, melting and decomposing at $162^{\circ}C$. From its alcoholic solution it crystallises in rectangular plates. It is a strong base, capable of decomposing ammonium salts, and forms well-defined salts with acids. When added to solutions of ferric or cupric salts, it precipitates the corresponding metallic hydrates. It is dextrorotatory and possesses marked reducing properties.

Cinchona Bark : Presence of Calcium Compounds of Quinic and Quinotannic Acids. J. E. De Vrij. (*Journ. Chem. Soc.*, July,

1897, from *Ned. Tydsch. Pharm.*) Cinchona bark contains a calcium salt which may be readily extracted from the macerated bark, preferably *succirubra*, by percolating with cold water until the liquid no longer becomes turbid on heating with ammonium oxalate; exposure to air should be avoided. The extract is evaporated to a syrup in a vacuum, and the salt precipitated by adding alcohol; the precipitate is then kneaded with alcohol, dissolved in water, and the cinchona-red which contaminates it removed by boiling the acid solution with magnesia. The author suggests that this plastic calcium salt is derived from an unknown compound formed by the union of quinic acid with quinotannic acid. Quinic acid is prepared from this salt by boiling its solution with a slight excess of calcium hydrate and evaporating to dryness; during evaporation, the quinotannic acid is converted into cinchona-red, which remains with the lime and calcium quinate. The quinate is extracted with hot water, filtered, crystallised by evaporation, and the pure acid obtained from it by means of oxalic acid.

Cactus Grandiflorus (*Cereus Grandiflorus*). E. M. Holmes. (*Pharm. Journ.*, 4th series, v. 165-167.) The first notice of the Central American plant known as *Cactus grandiflorus* (which is more correctly termed *Cereus grandiflorus*) as a remedy in functional heart disease appears to have been published by Rubini in 1868. Subsequently it has met with several notices between 1880 and the present time, but the results obtained in its examination by different investigators seem to be more or less conflicting. A want of uniformity has also been observed in the action of commercial preparations of the plant sold under the same name. The author of the present paper shows that these discrepancies are due to the frequent occurrence of a spurious drug in the market. He has obtained a series of specimens of the commercial drug, which he finds to present the following varieties:—

1. The dried stem of a *Cereus*, usually five-angled and about the thickness of the finger.
2. Fresh stems of a *Cereus*, apparently the same species preserved in spirit.
3. The triquetrous stem of a *Phyllocactus*.
4. The flowers of *Opuntia decumana*.

Besides these, there is imported a preparation of *Cereus grandiflorus*, consisting of the crushed stems and flowers covered with strong spirit of wine and packed in barrels, this preparation being diluted when required for use with a definite proportion of spirit in order to form the tincture.

Cereus grandiflorus, the source of the genuine drug, is described in detail in the present paper, which also contains woodcut illustrations of this plant, its flowers, and of longitudinal and transverse sections of its dried stem. A description, accompanied by woodcuts, is also given of the flower of *Opuntia decumana*. For all these reference should be made to the original paper.

A preliminary chemical examination by E. H. Farr shows the living stem of *Cereus grandiflorus* to contain small quantities of an alkaloid, besides waxy and fatty matters, mucilage, and several acid, slightly acrid, glucosidal resinous bodies, which are fairly soluble in water. The flowers of *Opuntia decumana* seem to contain neither alkaloid nor glucoside, but a characteristic yellow colouring matter.

Volatile Constituents of Goupia Tomentosa. W. R. Dunstan and T. A. Henry. (*Proc. Chem. Soc.*, 1898, No. 189.) *Goupia tomentosa* is a large tree growing in British Guiana, where it is known as "kabucalli." The wood, when freshly cut, emits a smell resembling that of valerian. By distilling the wood with water a mixture of acids of the acetic series was obtained, from which the authors have isolated and identified formic acid, isovaleric acid, normal capric acid, and lauric acid. A small quantity of succinic acid was also obtained.

Chinese Bandoline Wood. (*Kew Bulletin*, October, 1897.) The origin of this curious product, of which a specimen has long been in the Museum of the Royal Gardens, has hitherto remained unknown.

Shavings of the wood yield a mucilage, when soaked in water, which is used by Chinese ladies in "bandolining" their hair. E. Bretschneider ("Notes on some Botanical Questions connected with the Export Trade of China," 1880, 14) mentions the shavings as being exported from Canton to Peking, under the name of "meio kao pao hua" (i.e. cosmetic glue shavings), and their probable source as *Sterculia plantanifolia*. In 1895 G. M. H. Playfair, Consul at Ningpo, sent to Kew specimens in leaf of a tree called "tiao chang," which he had collected in the mountains near Ningpo, with the information that shavings of the wood were used for the purpose described above by the women of that part of China. These specimens were identified as *Machilus Thunbergii*, and flowering specimens subsequently received from the same source have confirmed the identification. It is further added, on the authority of A. Henry, that the Canton shavings are from the same tree.

The species is a native of Hong Kong and Chekiang westward to Szechuan, in China; also of Formosa, Japan, and the Corean Archipelago. Owing to the interest attaching to the identification, the species has been figured in Hooker's *Icones Plantarum* (t. 2538).

An East African Sandal Wood. MM. Stuhlmann and Volken. (*Pharm. Journ.*, from *Chem. Repert.*, xxi. 229.) The authors have discovered in East Africa a tree-like shrub, *Osyris tenuifolia*, belonging to the natural order *Santalaceæ*. The agreeable smell is due to a brown resin with which the wood vessels are filled; this originates in the cells of the medullary rays and of the wood parenchyma. The wood is very similar to the genuine Indian sandal wood.

Some New Mexican Remedies. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxvi. 124, from *Bull. Soc. Roy. Pharm. Bruxelles*, xlii. 2.) *Contrayerba blanco* consists of the roots of *Psoralea pentaphylla*, belonging to the *Leguminosæ*, and is employed in the treatment of intermittent fever. The alkaloid psoraline, which was isolated by Luzano, exists in the drug to the extent of 9 per cent., and crystallises in colourless transparent needles having a bitter aromatic taste. It forms well-defined crystallisable salts with acids. The powdered root and its fluid extract produce no toxic effects even in quantities of 100 grammes; and of the alkaloid 3 grammes are required to produce any decided toxic action. Psoraline possesses antipyretic properties similar to those of antipyrine, without producing unpleasant secondary effects, such as are often observed in the case of the latter.

Cuanchichic (*Garrya racemosa*) is a tree belonging to the *Cornaceæ*, and occurs plentifully in the mountainous parts of Mexico. The bark is bitter, and contains an alkaloid, to which Armendary has given the name "garrine." It is a crystallisable non-volatile solid, readily soluble in water and alcohol. Nitric acid imparts to it a rose colour. Its administration causes an increase in the number and fulness of the respiratory movements. The bark also acts as a stomachic and intestinal tonic, and is used in atonic diarrhoea in the form of a tincture, of which a teaspoonful is taken three times a day. An extract, partly aqueous and partly alcoholic, which contains the active principle, is often given in pill form in doses of 0.1 gramme combined with 0.01 gramme of extract of opium.

Digitalis and its Active Principle. C. C. Keller. (*Ber. der deutsch. pharm. Ges.*, vii. 125.) The author arrives at the con-

clusion that digitalis leaves contain the same principles as the seeds, viz., digitoxin, digitonin, and digitalin, though in different proportions. He doubts the individuality of digitalein, and is inclined to regard this substance as a mixture of digitonin with small proportions of digitoxin and digitalin. He considers digitonin as of little importance, as it does not possess the characteristic therapeutic properties of digitalis. Digitoxin, the most potent constituent of the drug, and the chief ingredient in Nativelle's digitalin, occurs in the leaves in quantities varying from 0.26 to 0.62 per cent., and in much smaller proportion in the seeds. In view of the great variation in potency between different samples of the leaves, and still more so of their galenical preparations, the author recommends the adoption of means for determining the therapeutic value of the drug on the basis of the amount of digitoxin contained in it. For this purpose he proposes the following process, in which he avails himself of the ready solubility of digitoxin and the comparative insolubility of digitonin and digitalin in chloroform:—

The leaves are extracted by repeated percolation with alcohol of 70 per cent.; after complete exhaustion the united percolates are evaporated, the residual extract is treated with water, washed into a beaker of about 250 c.c. capacity, the liquid diluted to 222 c.c., and mixed with basic lead acetate. The precipitate thus obtained is separated by filtration, and the excess of lead removed from the filtrate by means of sodium sulphate. The mixture is again filtered and the clear filtrate mixed with 2 c.c. of 10 per cent. solution of ammonia, and agitated four or five successive times with 30 c.c. of chloroform. After complete separation the chloroform solution is evaporated, and the residual digitoxin freed from fat and other impurities by dissolving it in 3 c.c. of chloroform and adding 7 c.c. of ether and 30 c.c. of petroleum spirit. On shaking this mixture the pure substance separates in white flakes, which are collected on a filter and then dissolved in hot alcohol, which, after evaporation, leaves the glucoside in a suitable condition for weighing. Digitoxin thus obtained forms a yellow solution in hydrochloric acid, which, when heated to 100°, becomes green and then greenish-brown. When a solution of digitoxin in glacial acetic acid containing ferric chloride is carefully poured upon concentrated sulphuric acid, the zone of demarcation of the two liquids becomes dark, and in a few minutes the acetic acid turns indigo-blue (Keller's reaction). The red coloration obtained by treating digitoxin with strong sulphuric acid alone appears to be due to the presence

of traces of digitalin, which may pass into the chloroform solution along with the digitoxin in the foregoing process.

The author regards the determination of digitoxin as sufficient for the purpose of pharmaceutical assays of the drug and its preparations. If desired, however, digitonin and digitalin may likewise be separated in the following manner:—Digitonin is obtained from the aqueous solution after shaking with chloroform, by expelling the ammonia, acidifying with hydrochloric acid, precipitating with tannin, dissolving the tannates in 50 per cent. alcohol, adding lead oxide, evaporating, extracting the residue with dilute alcohol, filtering, and evaporating the solution to dryness. Digitonin, when submitted to Keller's test, gives a bright red coloration. Digitalin is obtained from the filtrate from the digitonin tannates by adding more tannin solution and then strong sulphuric acid. The precipitate thus obtained is dissolved in alcohol of 70 per cent., the solution boiled with lead carbonate, the liquid decanted, evaporated with lead oxide, the residue extracted with alcohol, and the solution evaporated. When tested by Keller's reaction, digitalin gives a characteristic red zone.

Assay of Digitalis Leaves. G. Fromme. (*Pharm. Journ.* 4th series, v. 283, from Caesar and Loretz's *Geschäftsbericht*, September, 1897.) The author has applied Keller's process (see preceding abstract) to a number of commercial samples of digitalis leaves. Instead of extracting the drug by percolation with alcohol (of 70 per cent.), he finds it more expeditious and otherwise equally satisfactory to macerate 28 grammes of the leaves in 280 grammes of the spirit for at least three hours with frequent shaking, and then employs 207 grammes of the filtered alcoholic liquor (representing 20 grammes of leaves) for treatment in accordance with Keller's directions. The results obtained are tabulated on page 147.

Amount of Free Acid in Rhubarb Leaves. R. Otto. (*Chemist and Druggist*, li. 235.) The author finds that the acidity in these leaves increases as the plants mature. The following averages were obtained:—Up to May 1st, 1.112 per cent.; May 1st to 13th, 1.351 per cent.; May 13th to 29th (during the flowering period), 2.009 per cent.; and May 29th to June 20th (after flowering), 1.947 per cent. These are the amounts of acidity calculated as malic acid; but in the early stages oxalic acid is chiefly present, and as the plants advance that acid seems to be changed into malic acid.

Date.	Description of Drug.	Mois- ture.	Crude digitoxin.		Pure digitoxin.	
			Moist.	Dry.	Moist.	Dry.
1894.	Fine powder	9.51	.395	.437	.245	.271
1895.	Fine powder	8.26	.350	.385	.180	.196
1896.	Leaves gathered in the Harz:—					
"	July	6.51	.410	.439	.305	.326
"	August	7.37	.312	.337	.292	.315
"	September	8.64	.410	.449	.320	.350
"	Stalks removed:—					
"	November	10.27	.230	.256	.230	.256
"	Thuringian leaves:—					
"	July	9.11	.595	.655	.355	.391
"	October	8.25	.285	.311	.140	.153
"	Fine powder	6.45	.462	.492	.310	.331
"	Leaf stalks	6.00	.305	.325	.210	.244
"	Leaf stalks, older	6.56	.250	.268	.135	.145
1897.	Harz leaves without stalks:—					
"	June	6.19	.300	.320	.220	.235
"	Harz entire leaves	9.05	.275	.302	.215	.266
"	Harz leaves without stalks:—					
"	First year plants, July	7.11	.295	.318	.215	.231
"	Leaf stalks, July	5.00	.410	.462	.280	.294
"	Harz leaves without stalks	8.43	.315	.344	.235	.257
"	Second year's plants, July	8.68	.175	.192	.095	.104
"	Harz flowers:—					
"	Second year's plants, July	9.12	.395	.435	.335	.369
"	Harz entire second year's plant:—					
"	Without roots, July	11.12	.135	.152	.105	.118
"	Harz woody stalk of second year's plant:—					
"	July	8.86	.155	.170	.080	.088
"	Harz entire leaves:—					
"	July	5.98	.360	.383	.285	.303
"	August	6.56	.305	.327	.210	.225
"	Thuringian leaves without stalks:—					
"	June	4.98	.410	.431	.340	.358
"	July	8.17	.370	.403	.295	.321
"	Thuringian whole leaves:—					
"	July	5.74	.395	.419	.275	.292
"	Spessart leaves without stalk:—					
"	June, early	4.15	.365	.381	.225	.268
"	June, middle	8.60	.375	.410	.325	.356
"	July, early	11.36	.325	.379	.255	.286
"	August, early	5.45	.410	.434	.300	.318
"	Tannus leaves without stalk:—					
"	June, end	7.92	.260	.282	.175	.190
"	English selected leaves:—					
"	July	3.25	.350	.362	.180	.186

Eupatorium Triplinerve (E. Ayapana). (*Zeitschr. des oesterr. Apoth. Ver.*, xxxvi. 144.) The leaves of this plant, which have a bitter aromatic taste, are recommended as a tonic and stomachic. They are administered in the form of an infusion.

Varieties of Matico. G. Dethan and R. Bertaut. (*Journ. de Pharm. et de Chim.* [6], vi. 537. From *Pharm. Journ.*) The authors point out that the matico of commerce contains two varieties of *Piper angustifolium*, which differ somewhat in the shape of the leaves. These are present in herbaria under the names of variety α -*cordulatum* (*Artanthe elongata*), and variety β -*ossanum*, which corresponds to the *Piper angustifolium* of Ruiz and Pavon. The former has the leaves larger, shorter, and broader in proportion, and obliquely cordate at the base. There are also, in the anatomical structure, differences by which the two varieties can be recognised. The midrib of α -*cordulatum* is much less convex below than in the variety β -*ossanum*. The fibro-vascular bundles form a shallow arc and not a circle, and no stone cells are visible. Where the secondary nerves join the midrib there is a special cavity containing hairs and stomata. Such cavities are formed by the growing together of the nerves, owing to hypertrophy of the tissue, which separates them.

Jaborandi. H. Geiger. (*Ber. der deutsch. pharm. Ges.* [8], 356-425. From *Pharm. Journ.*) In a report on the histology of jaborandi leaves, the author confirms Holmes's observations that *Pilocarpus jaborandi* is a good species, that *Pilocarpus pinnatifolius* and *P. selleanus* are identical, and that *Pilocarpus spicatus* is the source of Aracati jaborandi. He further concludes that the species *P. subcoriaceus* and *P. ypanemensis* are identical with *P. spicatus*, which he also affirms is identical with the Aracati jaborandi. With respect to *Pilocarpus trachylophus*, however, he considers that it should be placed in a sub-genus or section of *Pilocarpus*, on account of the curiously-winged midrib of the petals (he having been fortunate enough to find some flowers), and also because of the vascular character of the warty projections of the epicarp, and of the club-shaped hairs at the base of the leaves. The plant yielding a false jaborandi, to which Holmes gave the provisional name of *Scartzia decipiens*, should, the author thinks, be separated as a sub-genus together with *S. alterna*, *S. matthewsii*, and *S. pilulifera*, the last two of which were pointed out by Holmes as the species most nearly allied, since these have large secretion cells, which are absent in the other species of the genus. It is certain that the above-mentioned species have much

smaller fruits than the other species, and have a facies which indicates that they might well be considered at all events a distinct section of the genus.

Kinkeliba Leaves. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 892.) These leaves are the produce of *Combretum altum*, a tropical West African shrub, growing close to rivers and streams but never near the sea coast. Schlagdenhauffen has shown the leaves to contain about 21 per cent. of tannin and a notable quantity of potassium nitrate. An infusion of the leaves, prepared with boiling water, is used by the natives in bilious fever, and also for checking colic and vomiting. The dried drug is stated by Ramboult to keep for years without losing its efficacy. The powdered fruits, mixed with oil, are used in the form of an ointment, which is applied to suppurating wounds.

Note on Hamamelis. L. Ough. (*Chemist and Druggist*, lii. 86.) There appears to be some uncertainty as to whether the leaves or the bark of *Hamamelis virginica* is best suited for the preparation of the dry alcoholic extract known in commerce as "hamamelin," and the author has therefore performed some experiments for the purpose of deciding this question.

The coarsely-powdered leaves were macerated in rectified spirit for twenty-four hours, then packed in a percolator and carefully exhausted with spirit, 2 gallons being employed for each pound of the leaves taken. After recovery of most of the spirit by distillation, the extract obtained was dried at a low temperature. By this method nearly 7 per cent. of a dark-brownish extractive, possessing a peculiar resinous smell, and of a slightly hygroscopic nature, was obtained.

A quantity of the bark was next taken, and treated in a similar manner, and this gave about 16 per cent. of a light-brown resinoid, which was more readily reduced to powder than the foregoing.

A third batch was prepared from the leaves, using spirit of sp. gr. .920. This yielded about 12 per cent. of resinoid, very similar in appearance to the last named.

Suppositories were prepared from the three samples of hamamelin referred to, and these were submitted for trial to a medical gentleman, who reported that those made from the hamamelin prepared from the leaves with rectified spirit were far more efficacious than those containing the resinoid from the bark.

Constituents of Bearberry Leaves (*Arctostaphylos Uva Ursi*). A. G. Perkin. (*Proc. Chem. Soc.*, 1898, No. 193.) Kawalier found the leaves to contain, besides gallic acid and arbutin, a

glucoside ericolin, $C_{34}H_{56}O_{21}$, which yields on decomposition ericinol, $C_{10}H_{16}O$, and a sugar. More recently, B. Degraffe (*Amer. Journ. Phar.*, 1896, 313) has identified the tannin as gallotannin. There is also present a yellow colouring matter of the composition $C_{15}H_{10}O_7$, crystallising in glistening yellow needles; this forms an acetyl compound, $C_{13}H_5O_7Ac_5$, melting at $188-190^\circ$. On fusion with alkali, phloroglucinol and protocatechuic acid were formed. Though resembling quercetin in these points it has the property of forming deep green solutions with dilute potassium hydrate. Regarding this reaction as due to impurity, the colouring matter was converted (*a*) into a sulphate, and (*b*) into an acetyl-derivative, and the colouring matter regenerated from these, but in each case it was unaltered in its behaviour towards alkaline solutions. Oxidation in alkaline solution did not destroy the green coloration until complete decomposition of the colouring matter had taken place. The presence of ellagic acid has also been detected, and thus besides gallotannin, ellagitannin is also present. The same colouring matter is also contained in broach leaves.

Structure of Eucalyptus Leaves. A. Schneider. (*Journ. Pharmacol.*, iv. 169.) The author deals with the comparative anatomy of two distinct leaf-forms of *Eucalyptus globulus*, the dorsiventral and isolateral. The earlier (dorsiventral) leaves are of little value medicinally, and are readily distinguishable from the others. They are comparatively thin, rather large, ovate and cordate at the base. In cross section palisade cells are found only on the upper side, and stomata are found on the under side only, about forty to the square millimetre. The isolateral leaves (or phyllodes), which appear later, are sickle-shaped, pointed, and not cordate at the base. They take a vertical position with the convex edge directed upward. The thickness of the earlier form is $167\ \mu$ to $208\ \mu$, and of the later form $334\ \mu$ to $501\ \mu$. The epidermis of the isolateral leaf is alike on both sides. It contains numerous stomata, thirty to thirty-five to the square millimetre, and these are visible as whitish dots scattered over the surface of the leaf when examined with a lens. In cross section the guard cells appear more sunken than in the dorsiventral type, and the thickness of the outer wall of the epidermis, inclusive of cuticle and wax, is from $15\ \mu$ to $20\ \mu$, whereas in the dorsiventral form they measure from $4\ \mu$ to $5.5\ \mu$. The isolateral leaves also have palisade tissue on each side, the spongy tissue being practically non-existent, and represented by the loosely united cells lying between the palisade tissues.

Daviesia Latifolia. J. Bosisto. (*Pharm. Journ.*, 4th series, vi. 187.) The author calls attention to this plant as a desirable subject for investigation, and mentions that in the districts where it abounds it enjoys a reputation as a remedy for hydatids, low fevers, etc. It is used in the form of an infusion made from the leaves or the flowering herb. The plant is indigenous to Victoria, Australia, and belongs to the natural order *Leguminosae*, sub-order *Papilionaceae*. It is a low growing shrub, and is also known as the "Native Hop Bush," probably on account of its bitter taste. The author has isolated from it a bitter crystalline principle and a semi-volatile oleo-resin. The small quantity of the crystalline principle at his disposal was handed by him to Dr. Paul for the purpose of a chemical examination (see next abstract).

Examination of the Crystalline Substance obtained from Daviesia Latifolia. B. H. Paul and A. J. Cownley. (*Pharm. Journ.*, 4th series, vi. 187, 188.) The authors have made a preliminary examination of the crystalline constituent isolated by Bosisto from *Daviesia latifolia* (preceding abstract). They report on it as follows:—

"It was a bitter neutral substance readily soluble in hot water, crystallising out on cooling in the form of fine white needles, which were rendered anhydrous at 100-120° C. It was insoluble in ether, soluble in boiling chloroform and readily dissolved by weak alcohol, from which it was left as an amorphous residue on evaporation, but soon crystallised on the addition of a little water. It was soluble in caustic soda, and re-precipitated apparently unchanged by acids. On purification of the original crystals by re-crystallisation from water the substance still retained its bitter taste and had a constant melting point of 146° C., after having been dried at 120°. Fusion with sodium gave no indication of nitrogen. It did not reduce Fehling's solution until after hydrolysis by boiling with acid. Its aqueous solution was precipitated by ammoniacal lead acetate, but not by neutral lead acetate."

The authors consider that these results point to the substance under examination as being either a glucoside or a sugar, more probably the former. They intend to continue their investigation on receiving a sufficient supply of the leaves for extraction.

Assay of Belladonna Leaves. W. A. Puckner. (*Pharm. Rev.*, 1898, 180.) The author proposes the following modification of C. C. Keller's general assay process, which is intended to meet the case of certain alkaloidal drugs, such as belladonna, henbane, etc., in which it is necessary to use relatively large quantities of material.

10 grammes of the dried and powdered drug are treated in a flask of 100 c.c. capacity with 50 c.c. of Keller's light chloroform-ether mixture and 5 c.c. of 10 per cent. solution of ammonia. After shaking the mixture frequently during one hour, it is transferred to a small percolator (improvised by drawing out a test-tube of about 50 c.c. capacity and plugging the outlet with cotton wool), and the percolate received in a separator. When all has passed through, the flask is rinsed with another 25 c.c. of light chloroform-ether, the latter poured into the percolator, and this rinsing repeated with a further 20 c.c. of the same liquid. The united ethereal solution in the separator, containing the total alkaloids from 10 grammes of the drug, is now treated in accordance with Keller's directions.

Adulteration of Sumach. M. Spica. (*Gazz. chim. Ital.*, xxvii. 349-358. From *Journ. Chem. Soc.*) Sicilian sumach, especially when exported in the form of powder, is often largely adulterated with the leaves of a tamarisk (*Tamarix africana*), or of mastic (*Pistachia lentiscus*); the author gives various methods for detecting the fraud.

One method consists in determining the nitrogen by Kjeldahl's method; sumach leaves contain 0.9127 (0.87-0.98) per cent. of nitrogen, those of *T. africana* 1.7690 (1.48-1.99) per cent., and those of *P. lentiscus* 1.6345 (1.47-2.01) per cent.

The composition of the ash derived from the leaves of the various plants also affords a criterion of the purity of samples of sumach, and is given in the appended table.

Ash.	Sumach. 6'80	<i>T. africana</i> . 12'40	<i>P. lentiscus</i> . 5'40
Composition of Ash.			
Insoluble and Si O ₂	24.05	37.10	6.20
Ca O	29.95	8.53	25.30
SO ₃	4.67	20.139	5.218
Mg O	6.25	9.368	5.760
Fe ₂ O ₃ , Al ₂ O ₃	7.15	7.400	7.410
CO ₂	12.60	1.130	13.750
P ₂ O ₅	3.344	1.1134	4.021
Cl ₂	3.101	4.4050	5.321
K ₂ O	6.305	7.950	14.604
Na ₂ O	2.004	2.630	12.176
Total	99.424	99.7654	99.760

Another method of detecting adulteration is afforded by applying Löwenthal's method for estimating tannin. The tannin is precipitated from the sumach extract as "copper tannate" by a cuprammonium solution; if the sumach is pure, this precipitate is completely soluble in dilute sulphuric acid, if adulterated with *T. africana*, a brick-red precipitate is left undissolved, and if sophisticated with *P. lentiscus*, a whitish precipitate remains undissolved by the dilute acid.

A colorimetric method of ascertaining the purity of sumach is also given, depending on the comparison of the colour of the extract with that of a standard solution containing 0.150 gramme of safranine in a litre of water. Five grammes of the sumach are boiled with 500 c.c. of water for half an hour, the liquid is cooled, made up to 500 c.c. and filtered; to 25 c.c. of the filtrate, in a beaker, are added 5 c.c. of basic lead acetate solution (having the sp. gr. 1.184 at 15° and containing about 250 grammes of basic lead acetate per litre) and 15 c.c. of caustic potash solution (having the sp. gr. 1.155 at 15° and containing 180 grammes of potash per litre). The solution is then evaporated to 15 c.c., when, if it remains reddish-brown and practically clear, the sumach is pure; if the solution is yellow and contains any considerable amount of precipitate, foreign matter is present. The 15 c.c. of solution is now diluted to 250 c.c. and filtered; when examined in the Duboscq colorimeter, it should be of the same tint as the standard safranine solution.

Further, on warming sumach extract with an excess of potash and a few drops of molybdate solution, a chocolate brown precipitate is obtained, which, if *T. africana* is present, is greenish by reflected light, and has a yellowish-brown reflex if sumach or mastic alone be present.

The Alleged Value of Celandine (*Chelidonium Majus*) in Cancer. (*Nouv. Rem.*, xiii. 509.) A series of trials with the extract of this plant, reported upon by Winter and Schmidt, have failed to give encouraging results. Beyond the stoppage of hæmorrhage in a few of the cases, no beneficial effects were obtained either by the internal or subcutaneous administration of the remedy. The injections proved very painful to the patients.

Constituents of Melilotus. F. Wischo. (*Pharm. Post*, xxix. 309, 310.) By distilling the dried flowering herb with water, and extracting the distillate with ether, Phipson obtained a fragrant product for which he suggested the name melilotol. This sub-

stance is now shown by the author to be a mixture of coumarin with small proportions of melilotaldehyde, melilotic acid and its anhydride.

Senecio Jacobæa in Functional Amenorrhœa. W. E. Fothergill. (*Pharm. Journ.*, 4th series, v. 543.) The author has obtained very favourable results in the treatment of functional amenorrhœa with a fluid extract of *Senecio jacobæa*, prepared in accordance with a process suggested by W. Kirkby (see next abstract). This drug appears to act through the nervous system, and not by causing pelvic congestion or contraction of the uterus, and is therefore in every sense a direct emmenagogue. The dose of the fluid extract is 20 minims four times a day. It is found to be a perfectly safe remedy which, even in very large doses, has no tendency to cause abortion.

Fluid Extract of Senecio Jacobæa. W. Kirkby. (*Pharm. Journ.*, 4th series, v. 543.) The author finds proof spirit to be a suitable menstruum for extracting this drug, and recommends the following directions for the preparation of a fluid extract:—

Senecio Jacobæa, herb, in No. 20 powder	. 3 pounds
Proof spirit	. a sufficiency

Moisten 1 lb. of the powder with 14 oz. of the spirit, and allow the mixture to stand in a covered vessel for twelve hours, then pack in a percolator and pour over it another 14 oz. of spirit; when the fluid begins to drop close the outlet for twenty-four hours, after which time percolation may be allowed to proceed until a sufficiency of extract has been obtained to exhaust the second pound of the herb. This portion is to be treated in precisely the same manner as the first, substituting the extract from the first percolator for the proof spirit. The third portion also is to be similarly exhausted, using the extract from the second percolator as menstruum. The first 48 fl. oz. from the third percolator is to be reserved for use. Made in the above manner the finished product has a specific gravity at 15°·5 C. of ·985, and yields 13 per cent. of extractive when dried at a temperature of 100° C. It can be kept for months without undergoing any change. The efficacy of an extract thus prepared has been proved by W. E. Fothergill (see preceding abstract).

Senecio Aureus as an Internal Hæmostatic. D. T. Gundrum. (*Therap. Gaz.*, October, 1897, 655–657.) The author reports very favourably on the action of this plant in stopping capillary hæmorrhage, especially in hæmoptysis, hæmaturia, and menorrhagia. It

is given in one drachm doses of the fluid extract four times a day, and seems to owe its hæmostatic properties to its action on the vasomotor nerves.

Curare and its Alkaloids. R. Boehm. (*Archiv der Pharm.*, cccxxv. 660-684. From *Journ. Chem. Soc.*) The curare alkaloids may be divided into two classes. Those of the first series, like curine, are partly crystalline and partly amorphous, soluble in water with difficulty, and are precipitated from solutions by ammonia. They are soluble in ether and give, without exception, voluminous precipitates with metaphosphoric acid. The characteristic toxic effect of curare is shown very slightly or not at all by them. The members of the second series are, like curarine, amorphous, yellowish-red substances, easily soluble in water, but insoluble in ether, and cannot be precipitated from solutions of their salts by ammonium hydrate or other alkalies. The halogen of their haloid salts can only be completely removed by silver oxide, and the alkaloids themselves show the most marked curare action.

Paracurare, or tube curare, is imported in bamboo tubes, and is the variety now usually met with in commerce. It is a dark brown mass impregnated with well-defined, yellowish coloured crystals of quercitol, often 2 cm. long. It contains 11-14 per cent. of water, and about 12 per cent. of ash, consisting for the most part of the carbonates, phosphates, and chlorides of potassium, calcium, and magnesium. Its toxic dose for rabbits is 0.005-0.01 gramme per 1 kilo. body weight.

Its solutions are precipitated by concentrated nitric acid, and at the same time a red coloration is produced which is intensified on heating. Metaphosphoric acid causes a voluminous precipitate, as do also the alkalies, many metallic salts, and all alkaloid reagents.

Curine, $C_{18}H_{19}NO_3$, is contained in paracurare to the extent of 12-15 per cent. It may be isolated by extracting the raw material with water, precipitating the solution with aqueous ammonia, and extracting with dilute alcohol. It crystallises from benzene in colourless, glistening, four-sided prisms melting at 161° , from ethylic alcohol in crystals melting at $159-163^{\circ}$, and from methylic alcohol in crystals melting at 212° . In the first two cases, the crystals contain one molecule of the solvent, which may be eliminated by heating to 180° in a stream of hydrogen. Curine is soluble in dilute acids forming colourless solutions, the taste of which is first sweet and then bitter; it also dissolves in concentrated alkalies, but is insoluble in water. When moistened with sulphovanadic acid, it dissolves, giving a black colour, but this soon

becomes dark blue on the edges and then clear red. Metaphosphoric acid and all the alkaloidal reagents cause precipitation; ammoniacal silver nitrate solution is reduced, but no red colour is obtained with Millon's reagent.

The *platinochloride* is an amorphous, yellow powder insoluble in water and alcohol; the *methiodide* crystallises in slender, yellow needles melting at 252–253°; and the *methochloride* in colourless, rhombic plates. When the latter is acted on with silver oxide, the ammonium hydrate *base* of quaternary methylcurine is obtained as an amorphous, yellowish-red powder.

Curine contains one methoxy-group; it cannot be benzoylated, but on treatment with methylic iodide and caustic potash the *methylic ether* of methylcurine is formed, as a non-crystalline substance, of which the platinochloride and aurochloride were analysed. When fused with potash, curine yields amino-bases and proto-catechuic acid; and when distilled with soda lime or zinc dust, the principal product is trimethylamine, and also a substance giving the characteristic reactions for paraquinoneanisole, showing the existence of a methoxyquinoline ring in curine.

Paracurarine (tubocurarine).—The filtrate, after extracting curine, contains quercitol and curarine, obtained by precipitation with mercuric chloride, etc. It is an amorphous, reddish-yellow substance, forming 9–11 per cent. of the raw curare. It is soluble in water and alcohol, forming a red solution with a green fluorescence, and is not identical with the previously known curarine isolated from calabash-curare. In its behaviour towards reagents, it resembles curine, except that it is not precipitated by the alkali phosphates. The *platinochloride* and *hydriodide* are yellow, amorphous powders. Tubocurarine contains one methoxy-group, but, unlike curine, is not acted on by methylic iodide, and is therefore not a tertiary base.

Calabash-curare used to be the common variety, and is that to which earlier investigations, as a rule, refer, but it is now seldom met with; it was sent over in calabashes. It is a hard, dark brown substance, with a peculiar smell and a very bitter taste. Its watery solution, which is slightly acid, is coloured purple by concentrated sulphuric and nitric acids. The active principle is curarine, obtained together with minute quantities of a second alkaloid by precipitating an aqueous extract of the raw material with platinic chloride, decomposing with sulphuretted hydrogen, and extracting with a mixture of alcohol and chloroform. It forms hard, glistening, garnet-red laminae, decomposing and giving off a

smell of trimethylamine when heated at 150° . It is odourless, has an intensely bitter taste; and gives blue to violet colour reactions with concentrated sulphuric, nitric, or sulphovanadic acid. The *platinochloride* is an amorphous, strongly electrical powder, decomposing without melting when heated, and the *hydriodide* is the only compound which shows a tendency to crystallise.

A third variety of curare is sent over in small jars of unburnt clay; it is a dry, blackish-brown substance, and differs widely in the amount of active principle which it contains. The following substances have been extracted from it:—

Protocurine, $C_{20}H_{23}NO_3$, crystallises from methylic alcohol in colourless, hair-like needles, which, on heating, turn brown at 160° and melt at 306° with decomposition. It gives no characteristic colour reactions. It yields crystalline salts possessing a bitter taste.

Protocuridine.—The free base is quite insoluble, but may be purified by boiling repeatedly with chloroform, when it is obtained in the form of hard, colourless, prismatic crystals melting at 274 – 276° ; it is easily soluble in dilute acids, is precipitated by the usual alkaloidal reagents, but gives no characteristic colour reactions. The *sulphate* and *platinochloride* are crystalline substances.

Protocurarine is an amorphous, red powder, easily soluble in water and alcohol, and is more poisonous than the other curarines. Its salts are inactive. It gives characteristic colour reactions with sulphuric, nitric, and sulphovanadic acids, and reduces ammoniacal silver nitrate solution.

Physiological Action of *Echium Vulgare*. (*Pharm. Zeitung*, xliii. 129.) *Echium vulgare* is a toxic plant belonging to the *Boraginaceæ*. The extract produces paralysis when administered to guinea pigs. Its physiological action resembles that of curare, for which it is suggested as a substitute. A chemical examination by A. Drescher indicates the presence of alkaloidal constituents. A number of other plants belonging to the *Boraginaceæ* have been previously stated by Buchheim to contain alkaloids more or less analogous to those of curare in their action; and distinct paralysing effects on the nerve centres have been established in the case of *Cynoglossum officinale*.

Pelargonium Reniforme. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 692.) This plant, which belongs to the *Geraniaceæ*, is recommended as a remedy for dysentery.

Glaucium Lateum. G. Marpmann. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxvi. 79 and 125, from *Südd. Apoth. Zeit.*) This plant, which belongs to the *Papaveraceæ*, is reported by the author to have proved a useful remedy in diabetes. It is given in the form of a fluid extract in $\frac{1}{2}$ drachm doses three times a day, before meals. The dose may be gradually increased.

Monsonia Ovata. (*Cape Agricult. Journ.*, x. 59. From *Pharm. Journ.*) This paper contains a full description and drawing of *Monsonia ovata*, a South African plant enjoying a considerable local reputation as a remedy for dysentery (see *Year-Book of Pharmacy*, 1897, 151.) The fruit possesses the characteristics of the *Geraniaceæ*, the long-beaked carpophore being a marked feature of the plant. The value of *Monsonia* appears to have been known at the Cape for over a hundred years, and was probably first brought to the notice of early settlers by the natives. It is also used as a remedy in anthrax, and as a demulcent in coughs and chest affections. Another member of the same order, *Peltargonium reniforme*, has even a greater local reputation in dysentery than *Monsonia*, and might with advantage be made the subject of an investigation. Several other Cape plants are mentioned by MacOwan, the Government botanist, as deserving proper therapeutic trials, viz., *Arctopus echinatus*, a remedy for leucorrhœa, *Cluytia hirsuta*, used for anthrax, and *Pentansia*, an ipecacuanha substitute.

Blepharis Capensis, a Remedy for Anthrax. (*Zeitschr. des oesterr. Apoth. Ver.*, lii. 305.) This South African plant, belonging to the *Acanthaceæ*, enjoys a great reputation among the Kaffirs as a remedy in anthrax. It has recently been tried in a typical case by Dr. Blaine of Kingwilliamstown Hospital, who appears to have effected a cure by the administration of a 1:8 tincture made with rectified spirit, which was given in 16 minim doses every three hours for several days.

Larrea Mexicana. C. B. Lowe. (*Amer. Journ. Pharm.*, 1898, 235-237.) *Larrea mexicana* is a Californian plant, belonging to the order *Zygophyllaceæ*. It was first described by Moricaud, *Pl. Nouv. Amer.* 71 (1833-46) as *Larrea mexicana*. Fremont, who met with the plant in the Mohave Desert, named it *Zygophyllum californicum*. In 1848 Engleman referred to the plant as *L. glutinosa*, and subsequently it was named by the Government botanist *L. tridentata*.

It is called by the Mexicans Gobernadora and Hideondo, and popularly Creosote Bush and Greasewood.

The habitat of the plant is rather an extensive one. It is found abundantly in the dry valleys of Kern County and in the Death Valley of Inyo County, California, and eastward from Walker's Pass and Talhichi to Western Texas, and southward into Mexico; also along the lower Muddy River in Nevada and the Santa Clara Valley of Utah.

The plant is a diffusely branched, densely leafy evergreen shrub, four to ten feet high. The leaves and small twigs are thinly spread with a covering of a strongly odorous resin that closely resembles in appearance ordinary shellac. To the abundance of this resinous matter the popular name of creosote bush is due, for in burning the green wood and leaves a pungent odour is detected and a dense smoke arises.

The functions of the resin seem to be to lessen transpiration, and thus to adapt the plant to the dry localities in which it grows. If this coating completely covered the leaves throughout the entire year, all evaporation would cease, and the death of the plant would ensue; but it has been found that while the leaves in the winter time seem thoroughly varnished, the spring growth examined in June shows very little coating. As herbarium specimens are gathered at this season of the year during the flowering period, they seldom show the resinous coating conspicuously, as it has not yet developed.

The leaves are nearly sessile; the thick resinous leaflets unequilateral, oblong, three to six lines long, with a broad attachment of the mid-rib, somewhat curved and acute. The flowers are solitary, bright yellow, consisting of five ovate, obtuse, silky, deciduous sepals; five unguiculate petals; ten stamens on a small ten-lobed disk, and a five-celled ovary, the cells about six-ovuled. The fruit is globose, two and a half lines in diameter, densely hairy, consisting of five indehiscent one-seeded carpels, which at length separate from the axes.

According to Avery, people living in the desert ascribe to the plant the property of curing external ailments, such as galls and bruises on horses and mules. Pedestrians who become footsore by walking on hot sand claim to have been quickly cured by soaking the soles of their feet in a decoction of this herb.

The following is a summary of the results of an analysis made at the author's request by Krewson:—

Moisture, 7 per cent. ; ash, 7.45 per cent.

Extracted by petroleum ether, 1.87 per cent.	{ soluble in water, 28.18 p.c. caoutchouc, 43 p.c. fixed oil and fat, .93 p.c.
" " stronger ether, 17.27 per cent.	{ resins and vegetable acids.
" " alcohol, 7.30 per cent.	{ resins, chlorophyll, and vegetable acids.
" " water, 11.71 per cent.	{ mucilage, 1.92 p.c.; dextrin, 4.33 p.c.; glucose, .31 p.c.; sucrose, .12 p.c.
" " alkaline water, 6.24 per cent.	{ albuminous and mucila- ginous matters, .13 p.c.
" " acidulated water, 3.17 per cent.	(pararabin, 1.59 per cent.)

Starch, 3.21 per cent.

The efficacy of this plant as an external remedy appears to be due to its antiseptic and stimulating properties. It is suggested that an excellent ointment might be prepared by incorporating a definite amount of the resin with lard, or by digesting the leaves with lard on a water bath. In the author's opinion, it may perhaps also prove useful internally as a stimulating expectorant analogous to eriodictyon.

Rhus Toxicodendron. F. Pfaff. (*Med. Chron.*, vii. 377.) The author has previously shown that this plant owes its characteristic irritating action to a poisonous non-volatile oil (abstract, *Year-Book of Pharmacy*, 1895, 135). He now supplies some further information respecting this constituent, which he describes under the name *toxicodendrol*. It is an oily liquid, soluble in ether and alcohol, and is precipitated from the alcohol solution by alcoholic lead acetate. Its action on the skin is slow, but most intense, even if applied in very minute quantities. It occurs in all parts of the plant, but predominates in the leaves and fruit, in which it occurs to the extent of about $3\frac{1}{2}$ per cent.

Arctopus Echinatus. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 691.) *Arctopus echinatus* is an umbelliferous plant growing in Cape Colony. It is stated to have a local reputation as a specific for gonorrhœa.

Asclepias Curassavica as an Insecticide. (*Kew Bulletin*, October, 1897.) This plant grows abundantly as a weed about the Isthmus of Tehuantepec (Southern Mexico), and is used by the Indians there to keep away vermin, especially fleas, for which latter purpose it is reported as being most successful. They make a rough broom of it with which they sweep the floors and walls of their huts, and are then not troubled with fleas for some time,

They also apply it with success to dogs by brushing their coats with it.

The Indian name of the plant is "Chilpati."

Adulterated Insect Powder. M. Caesar and M. Loretz. (*Pharm. Centralhalle*, xxxviii. 702.) The authors have observed the presence of powdered quillaia bark and euphorbium, as well as artificial colouring matters in some commercial insect powders. The presence of these admixtures imparts a more pungent odour to the powder, but is stated to lessen its efficiency, since neither of the drugs named seems to possess insecticide properties.

Assay of Santonica. K. Thæter. (*Archiv der Pharm.*, ccxxxv. 401-414.) The santonin is estimated by extracting the flower-heads with ether, evaporating the solvent, digesting the residue with milk of lime, treating the filtrate with aluminium acetate, then adding magnesia in excess, and extracting the thoroughly dried mass with pure anhydrous ether. On evaporating this ethereal solution, the santonin is left in a sufficiently pure state for weighing. The author finds that Kippenberger's method, recommended by Thomas, is less generally applicable, owing to the great difficulty of extracting santonin by means of glycerin in the presence of tannin.

As a very delicate reaction for the detection or identification of santonin, the author recommends the following:—With sulphuric acid alone, santonin does not give any coloration, but it is easily detected by means of furfuraldehyde sulphuric acid, with which it gives first a carmine-red coloration on warming, becoming bluish-violet, and finally dark blue; after prolonged digestion, a black precipitate is formed.

Strophanthus Nicholsoni: A New Species. E. M. Holmes. (*Pharm. Journ.*, 4th series, v. 209.) Through Dr. T. G. Nicholson, the author has received from Central Africa specimens of flowers and fruit of a *Strophanthus*, the seeds of which appear to be identical with those of the "white woolly" *Strophanthus*. The plant proves to be a new species hitherto undescribed. Dr. Nicholson has supplied the following particulars of the plant:—It is a small bush or shrub about three or four feet high, having the habit of growth of the flowering currant, *Ribes sanguineum*, but the main branches curve slightly outwards, and the slender twigs are patent at an obtuse angle.

The general colour of the flowers is of a pink hue with a tinge of dusky fawn. The throat of the corolla is yellow with dark purple lines and spots. The thread-like corolla segments or "streamers"

are of a pinkish purple. The whole corolla in withering fades to yellow, but does not readily fall off. The fruit is of a purplish plum colour, and marked with linear oval lenticels, some of which are nearly 1 cm. long. The district in which the plant was found extends from Lusengasia in the Senega country in a south-west direction to the Loangwa river. It is used as an arrow poison, and grows in alluvial plains at the base of granite hills, at an elevation of about 2,200 feet above sea-level.

Strophanthus Nicholsoni resembles *S. sarmentosus* in flowering before the leaves appear, but differs in its erect bushy habit, small flowers, and more slender flowering branches. From *S. Schuchardti*, to which it is most nearly allied, it differs in the lateral leafless inflorescence, the linear bracts and unequal calyx segments, in the latter nearly equalling the corolla tube, in the whole of the corolla being pubescent, in the much longer tails to the segments of the corolla, and in the pubescent glands. With sulphuric acid the section of the seeds gives the same rose colour as the "white woolly" *Strophanthus* seed of commerce. The velvety coating of the seeds hides the base of the awn, and, like that of the "white woolly" *Strophanthus* seeds, the hairs look white when their bases are presented to the light, and brownish-fawn colour when their apices are turned to the light. The average measurements of the seeds are the same.

A more detailed description of this new species, as well as wood-cut illustrations, will be found in the original paper.

Constituents of the Seeds of *Strophanthus Hispidus* and *S. Kombé*. Isolation of Choline and Trigonelline. H. Thoms. (*Ber. der deutsch. chem. Ges.*, xxxi. 271-277 and 404.) The powdered seeds of *Strophanthus hispidus* were freed from fat and oil by pressing and washing with petroleum ether, and then extracted with cold alcohol of 70 per cent. in a percolator. The alcohol was removed from the percolate by distillation, the residue extracted with water, the aqueous solution treated with a sufficient quantity of acetate of lead, the precipitate thus formed removed by filtration, and the filtered liquid freed from excess of lead by the careful addition of the requisite amount of ammonium sulphate, avoiding an excess of the latter. The re-filtered liquid was then mixed with a large excess of powdered ammonium sulphate, and the strophanthin thus separated was purified by repeated solution in alcohol and precipitation with ether. In this manner, strophanthin was obtained as an amorphous, perfectly neutral substance, quite free from nitrogen and impurities.

The filtrate, obtained after the removal of the strophanthin, was strongly acidified with sulphuric acid, and treated with solution of bismuth potassium iodide; the resulting precipitate, after being washed with dilute sulphuric acid and water, was decomposed with silver carbonate, the filtered solution mixed with hydrochloric acid, the silver chloride thus precipitated removed by filtration, and the clear filtrate evaporated to the point of crystallisation. This process yielded the hydrochlorides of two bases, which were identified as "choline" and "trigonelline." The hydrochloride of the former is soluble in absolute alcohol, in which that of the latter is insoluble.

The presence of choline and trigonelline was subsequently also established in the seeds of *Strophanthus Kombé* by the same process.

Constituents of Ricinus Communis. E. Schulze. (*Ber. der deutsch. chem. Ges.*, xxx. 2197.) The author has chemically examined the etiolated germinating shoots of *Ricinus communis*, and has isolated from them glutamine, $C_5H_{10}N_2O_3$ (a homologue of asparagine), and a new nitrogenous principle, $C_{12}H_{13}N_3O_3$, for which he suggests the name ricidin. The latter crystallises in colourless prisms, melting at $193^\circ C.$; it is only very sparingly soluble in cold, but more soluble in hot water, and also soluble in hot alcohol. It is not precipitated by mercuric nitrate, and differs in this respect and in its behaviour towards solvents from convicin. When heated with potassium bichromate and dilute sulphuric acid it gives off the odour of hydrocyanic acid. On heating it with dilute solution of sodium hydrate, it dissolves without evolving ammonia. The cotyledons were found to contain 3.5 per cent. of this substance.

Pomegranate Rind. H. Trimble. (*Amer. Journ. Pharm.*, 1897, 634-636.) The author has chemically examined this rind with the object of deciding the question whether or not it is as rich in tannin as it has been represented to be.

The fresh rind from some Spanish pomegranates purchased in the Philadelphia market gave the following results:—

	Per cent.
Moisture.	56.66
Ash in absolutely dry substance . . .	3.92
Tannin	28.38

A quantity of the tannin was extracted from the rind with acetone, and purified according to the usual method; on drying at 120° it yielded, on combustion, the following results:—

	Per cent.
Carbon	52.11
Hydrogen	4.17
Oxygen	43.72
	100.00

A portion of the tannin dissolved in water gave the following characteristic reactions:—

Ferric salts . . .	Blue-black precipitate
Bromine water . . .	No precipitate
Calcium hydrate . . .	Yellowish ppt., turning brown.

These reactions as well as the combustion results show this tannin to be identical with gallotannic acid. This is in accord with the results obtained by Culley with reference to the tannin of pomegranate root bark.

Active Constituents of Capsicum. M. Norbitz. (*Pharm. Journ.*, from *Pharm. Wochenschr.*, xiv. 525.) The author has extracted the pungent principle of this drug by the following process:—Powdered capsicum fruits were freed from fat with petroleum ether, and then extracted with ether. The ether was evaporated, the residue gently heated with just sufficient solution of potassium hydrate to saponify, then extracted with ether, and the latter removed. The ethereal residue was repeatedly treated with hot petroleum ether; on cooling, small crystals separated from it, amounting in weight to 0.05 to 0.007 per cent. of the extracted material. The substance thus obtained has a composition corresponding to the formula $C_{35}H_{34}N_3O_4$, and is neither an acid, a glucoside, nor an alkaloid. It was proved, however, to be the pungent principle, as in a dilution of 1:11,000,000 its taste was still noticeable.

Cardamoms. B. Niederstadt. (*Zeitschr. der oesterr. Apoth. Ver.*, xxxv. 720.) The author deals with the distinguishing features of genuine cardamoms, the produce of *Elettaria cardamomum*, and other kinds derived from species of *Amomum*, and shows that the histological differences are so slight as to render it very difficult to distinguish the powdered drugs by means of a microscopic examination. This observation is confirmed by Shaer, who states that the invariable presence of manganese in the ash of genuine cardamoms and the absence of this metal in the ash of other kinds may serve as a useful means of distinction.

Adulterated Aniseed. M. Volkart. (*Pharm. Centralh.*, 1898, 297.) The author confirms the occasional occurrence of hemlock fruits in this drug (see *Year-Book of Pharmacy*, 1897, 165), and

mentions as other frequent adulterants the fruits of *Setaria glauca*, and those of Indian grass or hairy rush (*Echinochloa crus galli*).

Recognition of Spurious Star-Anise. A. Tschirch. (*Rep. de Pharm.*, liii. 538.) The author states that genuine star-anise may be distinguished from the spurious drug by adding water to the alcoholic tincture. In the case of *Illicium anisatum*, the tincture is rendered turbid at once, owing to the separation of anethol; while in the case of *Illicium religiosum*, the tincture remains clear.

Assay of Kola and Guarana. C. H. La Wall. (*Amer. Journ. Pharm.*, 1897, 350, 351.) The author has devised an expeditious method of assay on the lines of Keller's process for the estimation of caffeine in tea. The directions are as follows:—

Into a separating funnel of convenient size, place 5 grammes of the drug and 5 c.c. of 10 per cent. solution of ammonia. Allow the mixture to stand for thirty minutes, then shake out the alkaloid with chloroform, using three portions of 20 c.c. each. If emulsification occurs, add powdered magnesium carbonate in small quantities until separation takes place. Transfer the mixed chloroform washings to a tared flask, recover the solvent in the customary manner, and weigh the residue, which consists of fat and alkaloid together.

Dissolve the fat with warm ether, using successive fractions of 20 c.c., until the ethereal washings leave no perceptible residue upon evaporation of a small quantity. With careful manipulation, the ether can be decanted each time without loss of caffeine; but as a precautionary measure, the ethereal washings may be filtered, the filter washed well, first with ether and then with chloroform, transferring the chloroform washings back to the flask for evaporating and weighing. The residue in the flask is almost pure caffeine, and the difference between the weights of the first residue and the last is the amount of fat present in the drug.

In the case of kola, the ether also removes the theobromine, which is usually but a small percentage and may be ignored.

The following comparative results have been obtained:—

Kola Nuts.

No. 1, exhausted with chloroform in Soxhlet	. 1.39 per cent. caffeine
" 2, exhausted by the foregoing process	. 1.37 " "
" 3, " " " "	. 1.48 " "
" 4, " " " "	. 1.43 " "
" 5, " " " "	. 1.40 " "

Guarana.

No. 1, exhausted with chloroform in Soxhlet . . .	4.32 per cent.
" 2, exhausted by the foregoing process . . .	4.68 " "
" 3. " " " " " " . . .	4.62 " "

In assaying the fluid extracts of the drugs above mentioned, however, the Lloyd ferric hydrate process has given the most satisfactory results.

Omphalea Megacarpa. J. H. Hart. (*Pharm. Journ.*, 4th series, vi. 184.) The author directs attention to the value of a fixed oil obtained by Prof. Calmody, of Trinidad, from the seeds of *Omphalea megacarpa* (nat. order, *Euphorbiaceæ*). It is a bland, tasteless oil, which, even in very small doses, acts as a prompt and efficient purgative, without causing pain or any unpleasant symptom. The seed is described as follows:—The shell of the seed is hard, rough, black, and somewhat brittle, whilst the interior is edible and of a sweet, nutty flavour, without any prominent characteristic. The fruit is some $3\frac{1}{2}$ in. in diameter, and has a glabrous outside skin, which is a quarter to three-eighths of an inch in thickness, and somewhat pulpy and fibrous. Surrounding the seeds there is found a thin parchment covering, but this is partly aborted. Beneath this is a large quantity of starchy tissue, three-eighths of an inch in thickness. The seed alone weighed only 13.150 grammes, but the starchy pulp surrounding a seed of medium size weighed 31.175 grammes, fully 50 per cent. of which was found to be pure starch, having peculiarly irregular, partly triquetrous and partly spherical grains, which adhere together in the first instance in masses of 10 to 20 grains, the triquetrous and irregular side inwards, and the rounded side outwards. The nuts are said to be eaten in the woods by travellers and hunters, and are hence known as the "Hunterman's nut." Probably the starchy portion is the edible part.

Constituents of Waras. A. G. Perkin. (*Proc. Chem. Soc.*, 1898, No. 197.) Waras is a purplish powder which covers the seed pods of *Flemingia congesta*, an erect, woody shrub of Africa and India. In its general properties and microscopic appearance it closely resembles kamala.

Flemingin, $C_{12}H_{12}O_3$, the principal crystalline constituent, was obtained as an orange-red powder consisting of small, prismatic needles melting at $171-172^\circ$. In appearance and numerous properties it resembles the rottlerin of kamala, but is distinguished from this by its solubility in alcohol, and by the browner tint of

its alkaline solutions. In an alkaline bath, it dyes silk a golden yellow, and is a stronger dyestuff than rottlerin. On fusion with alkali, it gave acetic acid, salicylic acid, and an acid of higher melting point which was not identified.

Homoflemingin ($C=69.97$; $H=5.75$), present only in minute quantity, forms glistening, yellow needles, melts at $164-166^{\circ}$, and possesses properties resembling those of flemingin.

The *resin of high melting point*, $C_{12}H_{12}O_3$, forms a brick-red powder soluble in alkali, with a deep brown tint, and yields acetic and salicylic acids on fusion with alkali. It dyes silk in shades which are redder than those produced by flemingin.

The *resin of low melting point*, $C_{13}H_{14}O_3$, is a deep orange-brown, transparent mass which melts below 100° , is soluble in alkali with an orange-brown colour, and closely resembles the resin of low melting point of kamala. On fusion with alkali, acetic and salicylic acids are obtained, and on boiling with nitric acid (sp. gr. 1.5) oxalic acid is formed.

From numerous characteristic reactions described in the paper, it is concluded that the above substances are closely related to, though not identical with those present in kamala.

Waras dyes silk a golden yellow shade, and is a much stronger dyestuff than kamala.

Therapeutic Properties of Species of *Calophyllum*. (*Pharm. Zeitschr. für Russl.*, xxxvi. 385.) The oil of the seeds of *Calophyllum pachyphyllum* and *C. brasiliense* is used as a remedy for tapeworm and rheumatism. The balsam obtained from the trunk of the tree is stated to be an external remedy for various complaints.

Preservation of Ergot. L. Aymonier. (From *Petit Monit. de la Pharm.*) Ergot may be kept unchanged for long periods by moistening it with an ethereal solution of tolu balsam, and then drying and storing it in carefully closed stoppered bottles.

Constituents of Ergot. C. Jacoby. (*Chem. Centr.*, 1897, 483, and 1059, 1060.) Three substances, all possessing similar therapeutic properties, were obtained from ergot, namely, *sphacelotoxin*, *secalintoxin* (a compound of sphacelotoxin with the inactive secalin), and chrysotoxin (a compound of sphacelotoxin with the inactive *ergochrysin*, $C_{21}H_{22}O_9$), identical with spasmotin. Chrysotoxin is pharmacologically as valuable as ergot, keeps unchanged for years, and in the form of its very soluble sodium compound is especially suitable for hypodermic use.

Chrysotoxin, $C_{21}H_{22}O_9$, which possesses the active properties of

ergot of rye, is precipitated from the ethereal extract by light petroleum, and after repeatedly dissolving and precipitating, is obtained as a yellow, tasteless, and odourless powder. It crystallises in needles from a saturated solution in ether; it is easily soluble in most organic solvents, but is insoluble in light petroleum, water, and dilute acids. It is very slightly soluble in alkalis and ammonia, and since it is precipitated from such solutions by carbonic anhydride, its composition is probably more analogous to that of a phenol than to that of an acid. These alkaline solutions undergo gradual decomposition, and after keeping some time are no longer precipitated by carbonic anhydride or acetic acid, but with hydrochloric acid yield a red precipitate of the inactive ergochrysinic acid.

Secalintoxin, $C_{13}H_{24}N_2O_2$, which has a physiological action similar to that of chrysotoxin, but quite unlike that of Kober's cornutin, is obtained from the ethereal extract by shaking it with acetic acid and precipitating the acid extract with sodium carbonate. It is very easily soluble in alcohol, ethylic acetate, benzene, and chloroform, slightly so in ether, very slightly in water, and insoluble in light petroleum. It is only slightly soluble in alkalis, and cannot be precipitated from such solutions, but dissolves easily in acids. The oxalate may be prepared by precipitating its ethereal solution with an alcoholic solution of oxalic acid.

Ergochrysin is obtained as an inactive, yellow substance by repeatedly dissolving chrysotoxin in glacial acetic acid and precipitating with water.

Secalin, $C_{29}H_{55}N_6O_{14}$, which is prepared by adding light petroleum to the ethereal solution of secalintoxin, is inactive, and crystallises in needles; it dissolves in a dilute solution of ammonia or sodium hydrate. With alcohol and hydrochloric acid it gives an intense violet coloration.

Chrysotoxin and secalintoxin owe their active properties to sphacelotoxin, which was obtained as a tar, and contains no nitrogen. It is converted into the inactive ergochrysin by the action of alkalis dissolved in alcohol. Sphacelotoxin probably occurs in these substances in a state of combination.

Anti-Emetic Properties of Iceland Moss. MM. Deying and Bricemoret. (*Répert. de Pharm.*, ix. 461.) The authors find this drug to be very useful in cases of vomiting arising from various morbid conditions. They have employed it in the form of a tincture made of 1 part of the drug to 5 parts of alcohol of 80 per cent.

Given in doses of 30 to 60 drops, this tincture was found to promptly stop vomiting in numerous cases.

Castoreum. M. Mingaud. (*Bull. de Pharm.*, 1897, 212.) Since the hitherto published statements respecting the composition of castor are all of old date, the author has re-examined this drug, and obtained the following analytical results:—Ethereal extract, 88.4 per cent.; alcoholic extract, 0.8 per cent.; aqueous extract, 0.1 per cent.; acetic extract, 0.6 per cent.; residue, 2.2 per cent.; volatile constituents, 7.9 per cent.; and ash, 0.75 per cent. "Castorin" could not be found; if it exists at all, it seems to be slowly formed in the drug on keeping. The dried drug contains phenyl alcohol, which is not present in the fresh substance.

Perfectly fresh castor is a white liquid of a cream-like appearance and consistence. It has a bitter taste, and only a slight odour, resembling that of game generally; but upon drying the drug the usual strong characteristic odour begins to develop.

The Pharmacy of Cantharides. H. G. Greenish and H. Wilson. (*Pharm. Journ.*, 4th series, vi. 255-259, and *Chemist and Druggist*, lii. 421-423.) The authors refer to the efforts which have at various times been made towards standardizing potent remedies. The majority of suggestions have been based upon one of two principles. Either a definite quantity of the pure active constituent of the drug is dissolved in a suitable medium, or the preparation is made from the drug itself, and the proportion of active constituent is regulated by assay. In the case of cantharides the active principle is present in so small a proportion that the assay of most of the official preparations of the drug appear impracticable. The authors therefore propose the use of cantharidin in place of the drug for making these preparations. They find that the official processes, which cover a variety of menstrua, do not completely exhaust the drug. Cantharidin is found to exist in two forms, viz., in the free state in which it is soluble in chloroform, and in a combined state in which it is insoluble in that solvent. Their first efforts were directed to the determination of cantharidin in the powdered flies, and led to a series of experiments in this direction. It was found that in the usual processes of assay the removal of the fat (extracted along with the cantharidin) by means of petroleum ether or carbon bisulphide, involved an appreciable loss of the active principle, for although pure cantharidin is insoluble in these solvents, it is not so when combined with fat. A further loss appears to be caused by the removal of resinoid matter. The correction of errors thus arising by making suitable allowances for

solubility did not prove satisfactory. In devising their own process the authors' chief aim has been to obtain the cantharidin in a really pure state, and without any appreciable loss. Owing to the importance of the subject, we give a full account of the details of the assay adopted.

Determination of Total Cantharidin.

20 grammes of the flies in No. 40 powder are mixed in a small mortar with 25 c.c. of a mixture of—

Glacial Acetic Acid	1 volume.
Rectified Spirit	2 volumes.
Chloroform	3 „

The moistened mass is covered over for about an hour, and then either allowed to dry spontaneously or at a slightly raised temperature. This is easily accomplished without loss of cantharidin. The dried mass is then packed in a Soxhlet extractor and exhausted with chloroform, the latter being first used to rinse out the mortar employed.

About one hour will usually suffice for complete extraction if the substance be well packed, but complete exhaustion should always be ascertained by removing the flask with the chloroformic solution, and continuing the extraction with a little fresh chloroform.

The chloroformic solution thus obtained is placed in a separator containing a little water, and the acetic acid, which passes into the water, is almost, but not quite, neutralised with solution of potash, and the whole well shaken.

The chloroformic layer is run off into a glass dish and evaporated, cautiously towards the end. The residue consists of fat, in which can be seen crystals of cantharidin. The fat is removed by washing with petroleum spirit (the washings being set aside), leaving in the dish crystals of cantharidin mixed with a green substance of a resinous nature. This residue is allowed to dry, and is then washed with successive small quantities of absolute alcohol until all green matter is removed, and perfectly white cantharidin remains. The alcoholic washings are carefully evaporated.

The cantharidin, dissolved or mechanically removed whilst washing out the fat with petroleum spirit, is now recovered; 20 c.c. of 10 per cent. solution of caustic potash are added to the petroleum spirit solution, and the mixture warmed until the fat is completely saponified; during this process most of the petroleum spirit is dissipated. The soap solution thus produced is diluted

with warm water and transferred to a separator, sufficient petroleum spirit being added to dissolve the fatty acids when liberated; it is now acidified with hydrochloric acid, when the fatty acids rapidly rise and dissolve in the petroleum spirit. The aqueous layer is quickly run off from beneath the petroleum spirit solution into another separator, the petroleum spirit solution washed with water and the washings added. The cantharidin is then removed by shaking with successive quantities of chloroform as long as cantharidin is removed; this must be ascertained. In the chloroformic solution thus obtained the residue from the alcoholic washings of the crystallised cantharidin is dissolved.

The chloroform now contains in solution chiefly cantharidin and the green resinous matter previously mentioned. It is placed in a separator and shaken with lime water, containing excess of calcium hydrate suspended in it, and solution of common salt, the latter causing the chloroformic layer to separate more readily.

In this way the cantharidin passes into aqueous solution, probably as cantharidate of calcium, whilst the chloroformic layer containing green resin and colouring matter is rejected.

The aqueous solution is filtered, acidified with hydrochloric acid, and shaken out with chloroform as before. This chloroformic solution is added to the cantharidin previously separated, evaporated cautiously, dried in a desiccator, and weighed. In this way a crystalline residue of cantharidin only very slightly coloured is obtained.

Determination of Free Cantharidin.

This is accomplished in the same way as the determination of total cantharidin, with the exception that the drug is not moistened with the acetic acid mixture before extraction, and, no acetic acid being present, the washing of the chloroformic solution with water becomes unnecessary.

Determination of Combined Cantharidin.

The proportion of combined cantharidin present is determined by difference between cantharidin yielded in determining total cantharidin and that obtained in determining free cantharidin.

The authors have found by experiment that no cantharidin is lost in filtering the solution obtained by shaking the chloroformic solution of cantharidin with milk of lime and salt solution; at least, when the quantity of cantharidin present is small. A test experiment showed that 100 c.c. of the filtered liquid contained .027

gramme of cantharidin in solution at 15° C. From these figures it is seen that if a large quantity of cantharidin be present a correspondingly large quantity of milk of lime must be employed.

The authors have also checked the method employed for recovering cantharidin from its solution in fat by an experiment with a known weight of cantharidin dissolved in fat free from cantharidin; the whole of the cantharidin was recovered.

Two samples of cantharides were assayed by this process, and the better one was used in the subsequent experiments. The following results were obtained:—

ASSAY OF CANTHARIDES.

Cantharidin in 20 grammes.

	Free.	Combined.	Total.
No. 1 . . .	·1025	·011	·1135
„ 1 . . .	·1005	·01	·1105
Mean . . .	·1015	·0105	·112
No. 2 . . .	·101	·031	·135
„ 2 . . .	·102	·035	·137
Mean . . .	·1015	·0315	·136

Cantharidin per cent. (mean).

	Free.	Combined.	Total.
No. 1 . . .	·5075	·0525	·56
„ 2 . . .	·5075	·1725	·68

In the next place the various official preparations of cantharides were carefully prepared from the sample (No. 2) referred to, and the products were assayed with the following results:—

Liquor Epispasticus.

Cantharidin in flies	·136
„ extracted	·141
Excess	·005

Tinctura Cantharidis.

Cantharidin in flies	·136
„ extracted by spirit	·123
„ left in flies	·014
Excess	·001

Emplastrum Cantharidis.

Cantharidin in flies	·136
„ extracted	·04
„ left in flies (by difference)	·096

Emplastrum Calefaciens.

Cantharidin in flies	·136
„ extracted by water	·088
„ left in flies	·042 ·130
Deficiency	·006

Unguentum Cantharidis.

Cantharidin in flies	·136
„ extracted by oil (free)	·049
„ left in flies (free)	·086
„ „ „ (combined)	·034 ·119
Deficiency	·017

The following table shows the weight (or volume) containing 1 part of cantharidin :—

Emplastrum Calefaciens	5,454
„ Cantharidis	1,500
Liquor Epispasticus	588
Tinctura Cantharidis	12,963
Unguentum Cantharidis	2,653

Guided by these figures the authors propose that preparations made from pure cantharidin, and containing it in the following proportions, should replace the corresponding preparations made from the drug.

	Found.	Proposed.	Dieterich.
Acetum Cantharidis	—	1 in 2,000	—
Emp. Calefaciens	1 in 5,454	1 in 5,000	—
Emp. Cantharidis	1 in 1,500	1 in 1,000	1 in 289
Liq. Epispasticus	1 in 588	1 in 300	1 in 316
Tinct. Cantharidis	1 in 12,963	1 in 10,000	—
Ung. Cantharidis	1 in 2,653	1 in 3,000	1 in 1,306

The third column contains the proportion of cantharidin recommended by Dieterich.

The following formulæ are proposed to take the place of the present official preparations :—

Liquor Epispasticus.

Cantharidin	1 part.
Castor Oil	6 parts.
Resin	3 parts.
Acetic Ether	up to 300 fluid parts.

Dissolve.

The castor oil and resin have been added to replace the natural fat of the cantharides; such an addition is necessary to aid the absorption of cantharidin by the skin. The resin renders the oil sufficiently viscid and adhesive to prevent it from easily leaving the spot upon which it has been painted.

Collodium Vesicans.

Pyroxylin	1 part.
Blistering Liquid	(as above) 40 fluid parts.

Dissolve.

This preparation has been tested, and it has been found that when applied to the arm it raises a blister in about eight hours.

Tinctura Cantharidis.

Cantharidin	1 part.
Chloroform	100 fluid parts.
Rectified Spirit	up to 10,000 " "

Dissolve the cantharidin in the chloroform, and add the rectified spirit.

Acetum Cantharidis.

Cantharidin	1 part.
Glacial Acetic Acid	200 fluid parts.
Acetic Acid	up to 2,000 " "

Add the glacial acetic acid to the cantharidin, then the acetic acid, and dissolve on a water bath.

The strength of this preparation has been based on the assumption that, by the process now official, the whole of the cantharidin would be removed from flies of average strength (containing .5 per cent. of cantharidin).

Unguentum Cantharidis.

Cantharidin	1 part.
Chloroform	1 "

Dissolve and add to

Yellow Wax	499 parts.
Olive Oil	2,500 "

previously melted, and warm till the chloroform is dissipated.

When made 1 in 2,000 and applied on lint to the arm, it blisters very much, and as it is considered undesirable that cantharides ointment should blister, 1 in 3,000 is suggested as a suitable strength.

Emplastrum Cantharidis.

Cantharidin	1 part
Chloroform.	a sufficiency
Yellow Wax, Prepared Suet, and Resin, of each equal parts	999 parts

This plaster softens readily, and can be spread without any difficulty. When applied to the skin it has sufficient adhesive power to remain, and when the blister has risen, it can be taken off easily.

Emplastrum Calefaciens.

Cantharidin	1 part.
Chloroform	a sufficiency.
Olive Oil	199 parts.
Resin Plaster	4,800 "

This is the official form simplified. Dissolve the cantharidin in the chloroform by the aid of heat, add the solution to the mixture of oil and resin plaster, previously melted in a water bath, and continue the heat till the chloroform is dissipated.

A Saccharine Exudation from *Larix Occidentalis*. H. Trimble. (*Amer. Journ. Pharm.*, 1898, 152, 153.) The author has examined a saccharine exudation collected from *Larix occidentalis* in British Columbia. It was of a brownish-yellow colour, somewhat porous, and possessed only a moderately sweet taste, associated with a slight turpentine-like flavour. It reduced Fehling's solution, and was found on analysis to have the following composition:—

	Per cent.
Reducing Sugar	19.38
Non-reducing Sugar	68.69
Moisture at 100° C.	5.02
Ash	0.44
Wood fibre, etc., removed by filtration	6.47

It is not identical with "Briançon manna" exuding from *Larix Europæa*, the chief constituent of which was described by Berthelot under the name of "melezitose."

Blue Grass Manna. R. T. Baker and H. G. Smith. (*Pharm. Journ.*, 4th series, v. 6, from *Proc. Roy. Soc., N. S. Wales.*) The authors describe a true manna found on a "blue grass" *Andropogon annulatus*. Its chief constituent is mannite, of which it yields 58 per cent., together with glucose and other sugars. The manna is mostly white, and in general appearance resembles eucalyptus manna. It is sweetish to the taste, not moist, breaks easily into fragments, and feels slightly greasy.

Catechu. A. G. Perkin. (*Journ. Chem. Soc.*, lxxi. 1135.) Pale catechu from *Uncaria gambir*, and black catechu from *Acacia catechu*, both contain a yellow colouring matter identical with quercetin. The quantity of this in the latter drug is but very small.

New Constituents of Pale Catechu. K. Dieterich. (*Chem. Centr.*, 1897, ii. 50, 51.) The author reports upon some new substances extracted from gambir (pale catechu), which he describes under the names of *gambirfluorescein* and *gambir-catechu-red* respectively.

Gambirfluorescein is prepared by moistening 5 grammes of gambir with water, decomposing with 20 per cent. sodium hydrate solution, and shaking with benzene or ether; the latter dissolves, not only the fluorescein, but also two other substances, the one of an oily and the other of a waxy nature. Gambirfluorescein is purified by treating with sulphuric acid, decomposing with sodium hydrate, and extracting with ether. Its solution becomes red in contact with the air, and, on evaporation, yields a red tar similar to a phlobaphen; this the author names gambir-catechu-red. The fresh alcoholic solution of gambirfluorescein is green by reflected and yellow by transmitted light. Gambirfluorescein, which contains no nitrogen, is insoluble in water and alkalies, but dissolves in acids; the solutions are not fluorescent. When a solution of it, in light petroleum, is cooled, white needles separate, but on drying they turn red and partly lose their crystalline structure. It is contained in the catechu either in the form of a catechin or of a catechutannic acid compound, or in both forms, the compound, which must be analogous in composition to a salt, becoming saponified in the process of extraction. Pegu-catechu does not contain this substance, and the main difference between these catechus is that, whilst gambir-catechu-red is not contained as such in gambir-catechu, Pegu-catechu-red is actually contained in Pegu-catechu.

Gambir-catechu-red is a reddish-brown, resinous powder, which floats on water, becomes electrified by friction, melts at 130–131°, is insoluble in ether, forms a blood-red solution in sulphuric acid, but neither yields fluorescent solutions nor possesses the basic character of gambirfluorescein. If a faintly acid solution in alcohol be neutralised with alcoholic potassium hydrate, an intensely dark blue, fluorescent solution is produced, similar to that of tincture of turmeric, but the colour disappears on adding more alkali or on warming. Gambir-catechu-red does not give a pre-

precipitate with tannic acid. The acetyl number shows that it still contains hydroxyl groups. The fatty oil obtained from the catechu by means of benzene has an acid number=14·89, ether number=43·33, and a saponification number=58·22; the iodine number is very low.

Catechu. A Characteristic Reaction of Gambir. K. Dieterich. *Chem. Centr.*, 1897, 245.) Of the two chief catechu extracts known in general commerce, Pegu-catechu (black catechu or cutch) is obtained from the sapwood of *Acacia Catechu*, while Gambir, or pale catechu, is obtained from *Uncaria Gambir*. The author finds that the latter furnishes the following characteristic reaction. When it is hydrolysed with a cold aqueous or alcoholic solution of potassium hydrate and the alkaline solution shaken with light petroleum of sp. gr.=0·7, the latter acquires a fine, green fluorescence; the substance dissolved can be obtained as a brittle, resinous mass which is insoluble in water and contains no nitrogen. A 2 per cent. solution of gambir in alcohol, when boiled for 10 minutes with dilute hydrochloric acid, gives a blood-red coloration; on the other hand, the red colour of solution of Pegu-catechu almost entirely disappears on boiling with hydrochloric acid. Both kinds give green colorations with ferric chloride in alcoholic solution, but in the case of Pegu-catechu the solution rapidly becomes brown, and gives a dark-brown precipitate which turns bluish-violet with alkalis. With ferrous salts, solutions of gambir give a green and Pegu-catechu a grey coloration. When alcoholic potash solution is added to a dilute solution of Pegu-catechu in alcohol, a violet precipitate is formed; gambir gives a yellowish-white precipitate. Gambir is partially soluble in alcohol, and forms a clear solution, whilst Pegu-catechu is sparingly soluble, and yields a turbid solution.

Assay of Opium. C. Montemartini and D. Trasciatti. (*Gazz. chim. Ital.*, xxvii. 302-335. From *Journ. Chem. Soc.*) Most of the test estimations of morphine in opium by various methods have been made on a few samples of opium of approximately the same composition. The authors have determined the morphine in nine samples of opium (A to K), differing widely in composition, by the principal methods, the results being summarised in the accompanying table; the best were obtained by a method which the authors themselves have elaborated, depending on extracting the morphine with a sodium chloride solution. The analysis is carried out as follows:—Ten grammes of the

powdered opium, dried at 100°, are macerated in a mortar with 90–100 c.c. of a 20 per cent. sodium chloride solution for 1 hour, and then thrown on to a small filter, the residue being again treated for 1 hour with 60 c.c. of the sodium chloride solution. The mixture is then filtered, and the residue repeatedly treated with sodium chloride solution until a colourless filtrate is obtained, or until a drop gives no reaction with Fröhde's reagent. The mixed filtrates are evaporated to dryness on the water bath, and the powdered residue is repeatedly extracted with boiling absolute alcohol (300–350 c.c.) until the extract gives no reaction with Fröhde's solution; the alcoholic solution is evaporated, and the residue, after being covered with 15 c.c. of very dilute ammonia and left for 24 hours, is collected on a tared filter, washed with aqueous morphine solution until the washings are colourless, and dried at 100°. The filter containing the morphine is then put into a tap funnel and covered with chloroform; the latter is run off and the treatment repeated until, on evaporating a few drops, taking up the residue with hydrochloric acid and adding

Sample.	Italian Pharmacopoeia of 1892.	Helfenberger.		Langlois.	Guichard.	Cannapin and Van Eijk.	Perger.	Squibb.	With Na Cl.
		Aliquot parts.	With exhaustion.						
A	14.35	11.05	10.46	—	—	10.94	16.84	—	16.70
B	12.30	11.40	11.52	—	—	11.76	15.60	15.02	15.80
C	10.10	7.68	10.28	10.09	14.36	10.76	12.29	12.40	12.00
D	6.40	5.10	4.40	5.89	—	6.74	8.60	10.85	8.36
E	10.12	10.15	10.44	11.60	11.70	11.42	13.04	18.11	13.55
F	4.08	—	—	—	—	—	8.77	8.89	8.67
G	—	—	—	—	—	13.00	—	16.09	16.55
H	—	—	—	5.53	19.42	5.84	11.37	11.07	11.42
K	7.36	—	—	9.58	14.24	10.12	12.82	13.58	13.51

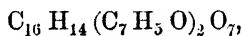
soda, no turbidity is obtained. The morphine is then again brought on to a tared filter, dried at 100°, and weighed; the whole determination takes about four days for its completion.

The most concordant results are obtained by this method and by those of Perger and Squibb.

Assay of Aloes. G. L. Schaefer. (*Journ. de Pharm.* [6], v. 296.) Fifty grammes of aloes are dissolved in 300 c.c. of warm water, to which a few drops of hydrochloric acid have been added;

when cold, the solution is separated from the resin, 50 c.c. of ammonia (20 per cent.) and a solution of 15 grammes of calcium chloride in 30 c.c. of water are added, and the whole rapidly shaken. At the end of 15 minutes the precipitate is well pressed, or separated by means of a centrifugal machine. The precipitate is triturated in a mortar with hydrochloric acid, and the free aloin and calcium chloride dissolved in as little water as possible; the solution is filtered if necessary, and the residue washed with boiling water: the aloin separates from its aqueous solution on cooling. The best yields are obtained when ice is employed.

Barbaloin. E. Léger. (*Comptes Rendus*, cxxv. 188. From *Pharm. Journ.*) The author has re-investigated barbaloin. He concludes that the discrepancies of different workers are in the main caused by the ease with which aloin is decomposed, particularly in the presence of alkalies, and even of water. As most workers have employed water in their process of extraction, the body which they have ultimately obtained has probably not been pure. In his research the author has avoided the use of water, treating the aloes with acetone containing a little glacial acetic acid. The insoluble residue was impure aloin, a portion of which, however, was removed by the menstruum, to which ether was added, partially precipitating the resins. The ether and part of the acetone were distilled off, leaving a syrupy residue, which in a few days formed a mass of interwoven needles. These, with the crystals insoluble in the first menstruum, were united and purified by two or three recrystallisations from methylic alcohol. The body then has the formula $C_{16}H_{16}O_7H_2O$. From water it crystallises in cottony-yellow needles, having three molecules of H_2O . With benzoyl chloride it gives benzoyl barbaloin,



and with acetyl chloride, diacetyl barbaloin, both of which are amorphous, tasteless bodies. The mother liquors of the acicular barbaloin crystals, when concentrated by evaporation, yielded short, yellow lamellæ grouped in clusters. These proved to be an isomeric barbaloin containing $3H_2O$.

Bisabol Myrrh. M. Tucholka. (*Pharm. Centr.*, xxxviii. 500.) In addition to the official myrrh, a second kind is exported from Somali land to India, and from there to China. This myrrh, which is called "habaghadi" by the Somalis, and "bisabol" by

the Arabs, consists of pieces of the size of a nut, frequently adhering to each other, varying in colour from pale yellow to brownish black, and having the taste of genuine myrrh but a less fragrant odour. As this drug does not give the characteristic reaction of pure myrrh (red coloration of an ethereal extract with bromine vapour), the author describes the following characters for its recognition and for its distinction from the official article:—Six drops of petroleum ether extract (1:15) are mixed with 3 c.c. of glacial acetic acid and 3 c.c. of sulphuric acid added so as to form a lower layer. A rose-red colour is developed at the line of contact, and after a short time the whole of the acetic acid layer is coloured red, remaining so for some time. If the petroleum ether extract is more concentrated the resulting colour is brown. The official myrrh treated with this reagent gives only a slight rose coloration of the acid layer, which does not increase; the contact line of both fluids is first green, changing on standing to brown with a greenish fluorescence. An analysis of bisabol myrrh gave: gum soluble in water, 22.1; gum soluble in soda solution, 29.85; resin, 21.5; bitter principle, 1.5; ethereal oil, 7.8; water, 3.17; vegetable and inorganic matter, 13.4. The ethereal oil gave the above distinctive colour reaction very markedly. By means of a modification of Wallach's method for the preparation of the hydrochloride of the terpenes, small, well-formed tablet-shaped crystals melting at 79.3 were obtained. The author calls this product "Bisabolene"; he is unable to identify it with any known terpene. It has the unusually high boiling point of 260° C. The red oil from which the crystalline hydrochloride was separated, when fractionated between 230° to 239°, gave the characteristic colour reaction. Benzoyl chloride reacts very violently with it on gentle heating. The resin removed by alcohol has a strong acid reaction. Two distinct acids were obtained, one of which furnished a soluble and the other an insoluble lead salt.

Copaiba. L. F. Kebler. (*Amer. Journ. Pharm.*, 1897, 577-579.) The author has examined a number of samples of copaiba from different sources, and summarises his results in the following table, showing the great variability in the composition and characters of this drug:—

Source.	Kind of Balsam.	Specific Gravity at 15° C.	Specific Gravity at 25° C.	Per cent. of Oil Distilled from Metallic Bath.	Boiling Point of such Oil, °C.	Specific Gravity of such Oil at 15° C.	Specific Gravity of Steam-Distilled Oil at 15° C.	Specific Gravity of Steam-Distilled Oil at 25° C.
Carthagea . .	Copaiba	0.9560	0.9506	53	250-265	0.9207	0.8997	0.8981
South America .	Copaiba	0.9416	0.9372	56	253-268	0.9174	0.9014	0.9000
Central America	Copaiba	0.9526	0.9467	76	250-274	0.9231	0.9132	0.9067
Collected in 1846	Copaiba	0.9410	0.9381	62	253-270	—	0.9036	0.8978
South America .	Para	0.9254	0.9200	90	258-270	0.9116	0.9079	0.9066
South America .	Para	0.9661	0.9583	88	254-268	0.9100	0.9093	0.9037
South America .	Para	0.9874	0.9818	51	253-265	0.9346	0.9019	0.9100
South America .	Para	0.9176	0.9116	92	256-268	0.9150	0.8951	0.9043
South America .	Para	0.9146	0.9101	90	254-264	—	0.8936	0.8904
South America .	Solidifi- able	0.9926	1.0000	23	260-269	0.9283	0.9201	0.9172
Commerce . .	Gurjun	0.9576	0.9516	—	—	—	0.9200	0.9146
Commerce . .	Gurjun	0.9796	0.9722	54	245-263	0.9202	0.9192	0.9141
Commerce . .	Gurjun	0.9531	0.9476	66	240-260	0.9146	0.9063	0.9176
Commerce . .	—	—	—	—	B.P. of Oil	—	0.9194	0.9087
Commerce . .	—	—	—	—	258-263 260-269	—	0.9133	0.9101

The U.S. Pharmacopœia only recognises copaiba which is solidifiable with calcined magnesia, a requirement to which the great majority of commercial samples of the drug do not respond. The author finds that no sample having a specific gravity below 0.980 will solidify well; and it is therefore only such samples as are very rich in resin and very poor in essential oil that will conform to this test. The gelatinisation test for the detection of gurjun oil is found to be useless for mixtures, and should, in the author's opinion, be replaced by the glacial acetic acid test or one equally trustworthy.

Indian and American Resins of Podophyllum. E. J. Millard. (*Pharm. Journ.*, 4th series, vi. 304, 305.) A recent examination of a number of commercial samples obtained from American, German, and English manufacturers showed that the latter are sometimes supplying the product of *P. emodi* under the title of podophyllum resin B.P. The author points out that neither the colour of the resin nor its behaviour towards solvents (alcohol or ammonia) affords trustworthy indications of its source. He has noticed that the Indian resin gives an orange to red colour with strong sulphuric acid when a minute quantity is sprinkled on a

containing freshly secreted balsam. This development of schizogenous into lysigenous cavities is at present unknown in other plants.

Purified Liquid Storax. H. Krüer. (*Pharm. Zeitung*, 1897, 882.) The author effects the purification of this drug by boiling the raw material over an open fire till it ceases to froth (in order to completely expel the moisture present), then keeping the vessel containing it for several hours in a water bath (to allow sand, etc., to settle out), and straining the settled liquor.

Purified liquid storax has a specific gravity of 1.101–1.106, compared with water at 100° C. A sample having a specific gravity of 1.099 or less may be regarded as suspicious, and should be more closely examined.

Liquid Benzoin. R. M. Shoemaker. (*Amer. Journ. Pharm.*, 1898, 9, 10.) The name liquid benzoin is given by the author to a benzoin solution intended for benzoating lard. This solution is prepared by macerating 20 grammes of benzoin in 40 c.c. of ether for twelve hours, filtering the solution, then adding to the filtrate a sufficient quantity of castor oil to obtain 15 grammes of product after the removal of the ether by distillation. The author's object in introducing this solution is to ensure greater uniformity in the product than it is possible to obtain in the preparation of benzoated lard by the direct use of benzoin. In order to prepare benzoated lard from this solution, 965 grammes of dehydrated lard and 20 grammes of white wax are melted by steam heat; the liquid benzoin is then added, and the mixture stirred until it is cold.

Castor Oil and its Active Constituent. H. Meyer. (*Chem. Centr.*, 1897, 662, and *Archiv der Pharm.*, cccxxv. 184–191.) The author finds that the purgative action of castor oil is not affected by heating the oil to 300° C., or by the action of dry hydrochloric acid. Ricinoleic acid, which is, as Buchheim observed, just as effective as castor oil, does not lose this property by heating to 300°, or by boiling with potassium hydrate solution, but it is converted by the action of mineral acids into ψ -ricinoleic acid, whose alkyl salts are inactive. Ricinolamide is inactive, but yields an active ricinoleic acid.

Castor oil owes its purgative property to the presence of ricinoleic acid, or such compounds of it as are decomposed and yield ricinoleic acid in the intestines. Compounds such as magnesium ricinoleate, which are not decomposed, are inactive.

In reference to Juillard's observation that dihydroxystearic acid is contained in castor oil, the author states that he also had isolated this compound at the time of his previous research (*Arch. expt.*

Path. Pharm., 1890, 28, 145) by the action of dilute hydrochloric acid on the purified calcium salt prepared by Claus's method. The ethereal solution, after washing and standing, deposits crystalline leaflets which melt at 140–141°, and closely resemble cholesterol. They are, however, insoluble in ether, and do not form an additive compound with bromine. Analysis indicates an empirical formula, $C_{18}H_{36}O_4$. From 2 kilogrammes of oil, 1·5 grammes of pure substance are obtained. Attempts to prepare this compound by heating ricinoleic acid with water at 300°, or with sodium hydrate solution at 200°, failed.

Juillard found that the triglyceride of ricinoleic acid could not be prepared by Berthelot's method owing to the polymerisation of the acid, whereby a glyceride of polyricinoleic acid was produced. The author finds that preparations of the pure acid which originally had a sp. gr. = 0·9460 at 12°, after a lapse of eight years had become more viscous, of a sp. gr. = 0·9680 at 12°, and required about one-third less alcoholic potassium hydrate solution for neutralisation. Hübl's iodine number was also found to have diminished from 85·53 for the freshly prepared acid to 64·06. The specific gravity, saponification number, and molecular refraction agree with the numbers calculated on the assumption that these old preparations are a mixture of 30 parts of ricinoleic acid with 70 parts of diricinoleic acid. By the action of alcoholic potash, ordinary ricinoleic acid may be obtained.

The author has succeeded in preparing the triglyceride of ricinoleic acid by passing a slow stream of carbonic anhydride into a mixture of the acid with glycerin, and heating at 280–300°. The product, freed from excess of glycerin by the addition of water, forms an almost colourless neutral oil possessing the same viscosity, taste, and physiological action as castor oil. It dissolves in 96 per cent. alcohol and in methylic alcohol, whereas Juillard's glycerides of polyricinoleic acid only partially dissolve. The saponification number agrees with that of the triglyceride. The sp. gr. of two preparations was 0·959 and 0·984 respectively, whilst that of ordinary castor oil is 0·95 to 0·97, and that of the oil freed from stearates by cooling to +5° is 0·9635 at 15°. Specific rotatory power $[\alpha]_D = +5·16°$; for castor oil $[\alpha]_D = +4·68°$. Hübl's iodine number = 71·86·4, the calculated number for the pure triglyceride being 81·62, whilst that of ordinary castor oil is 84·0–84·7. The synthetically prepared oil, unlike the ordinary oil, does not form solid ricinelaidine by the action of nitrous acid, but only becomes more viscous.

The sp. gr. of triglyceride preparations which had been kept eight years was found also to have increased, in one case to 0.9980 at 14.5°, in another to 1.009. The numbers calculated from Traube's constants for the simple formula $C_{57}H_{104}O_9$, are 0.995 for the double formula, and 1.000 for the treble, hence polymerisation has evidently taken place. This must have been effected by simple physical association of the molecules, or more probably by union with disappearance of the double bonds, for condensation between carboxyl and hydroxyl groups, as in the case of the free acid, is here impossible. The iodine number was also found to have become less.

The author regards Juillard's preparation, which is stated to be a mixture of two molecular proportions of triricinolein with one of diricinolein, as the nearly pure diglyceride of ricinoleic acid, with which assumption Juillard's saponification number very nearly agrees. He thinks that the determination of the molecular weight by Raoult's method may have been vitiated by polymerisation of the glyceride.

Puglia Olive Oil. F. Canzoneri. (*Gazz. chim. Ital.*, xxvii. 1-5. From *Journ. Chem. Soc.*) The fresh very fruity olive oil from puglia often possesses a markedly bitter taste, and burns the throat; the burning flavour of old rancid oil is somewhat similar to, but quite distinct from, this. The unpleasant flavour (technically termed "raspino") is lost on keeping the oil for some time.

By distilling the oil in a current of steam, the author has separated from it an oil of the nature of camphene, to which olive oil probably owes its characteristic odour and taste, and eugenol, to which the burning flavour is due. It is noteworthy that Sobrero (*Annalen*, 1845, 54, 88) obtained eugenol by distilling olivil, $C_{14}H_{18}O_5$. The author has also found catechin, catechol, gallic and tannic acids and a new bitter substance, which in aqueous solution is coloured red by ammonia and violet by ferric chloride, in the faulty oils examined; the bitter flavour of the oil is attributable to these constituents.

The faulty oils in most, but not in all, cases, give Baudouin's reaction which is supposed to be characteristic of sesame oil; the author finds that sesame oil does not always give this reaction.

Oil of Theobroma : Its Specific Gravity under certain Conditions. E. White. (*Pharm. Journ.*, 4th series, vi. 69.) The author calls attention to some remarkable variations in the specific gravity of this oil. He has found that the specific gravity of this substance taken at intervals after being melted and cast in moulds

increases progressively from about .950 to .995 in round numbers, only attaining the highest value after several days. Moreover, the specific gravity at a constant interval after solidification is slightly affected by the length of time during which the oil has been previously heated, prolonged exposure to heat causing a depression of the sp. gr., which, however, in all cases seems to attain a constant value after a few days.

A portion of oil of theobroma cut from a block was found to have a specific gravity of .992. Another piece of the same sample was placed in a wide-mouth bottle and just melted at 40° C. A portion poured out and solidified had a sp. gr. of .969 thirty minutes after solidification. The bottle containing the rest of the oil was then placed in a water oven and heated continuously for eight hours, a portion being poured into a mould at intervals of one hour. The sp. gr. of each portion, taken as before, varied between .950 and .975. Although no direct connection could be established between the sp. gr. and the duration of the exposure to heat, the lowest figure was obtained after eight hours in the water oven. The determination of the sp. gr. of each portion was continued at intervals of two hours during the whole day, and repeated daily for the next two days. The total result is summarised as follows:—The sp. gr. increased during the first day from about .950 to .980. On the second day the nine samples ranged from .984–.986, and on the third day from .986–.991.

Portions of five different samples of oil of theobroma were just melted and cast in small porcelain crucibles so as to have, after solidification, the form of flat cakes. This form was adopted in preference to the conical suppository form, as there seemed less risk of including air bubbles in the former case. The sp. gr. of each sample was determined an hour later, then on the three succeeding days, and finally three weeks later, with the results embodied in the following table:—

Variety of Oil.	Specific Gravity.				
	1st day.	2nd day.	3rd day.	4th day.	3 weeks later.
Guaiaquil . . . . .	.977	.983	.984	.992	.995
Grenada . . . . .	.978	.986	.990	.993	.997
Trinidad . . . . .	.983	.991	.992	.992	.994
Ceylon . . . . .	.975	.982	.989	.991	.991
Caraccas . . . . .	.979	.981	.987	.998	.998

The author has also investigated the question whether the great variation observed in the specific gravity of moulded portions of oil within the first few hours of solidification may be due to the interior portion of the oil not having attained the temperature of 15° C., this being the temperature at which all the specific gravities were determined in his experiments. He arrives at the conclusion that the observed variations are not due to this cause, but that they probably originate in some molecular disturbance caused by the heat applied in melting, the effects of this disturbance not passing away entirely until the expiration of several days.

With regard to the bearing of the foregoing results on suppositories, the author states that from this cause alone a variation of half a grain in the weight of a 15-grain suppository is possible, according to the time allowed to elapse between the solidification of the mass and its trimming and removal from the moulds.

Peanut Oil. S. P. Sadtler. (*Amer. Journ. Pharm.*, 1897, 490-492.) The author deals with the source and preparation of this oil, and then gives the following tabular representation of the results of his analyses:—

	Oil from Virginia Nuts.	Oil from Spanish Nuts.	Oil from African Nuts.	Oil from Pudu- cheri.	Commer- cial Oil.
Specific gravity at 15° C.	0.917	0.9175	0.911	0.920	0.9209
Saponification value	192.53	190.68	194.	193.1	192.1
Iodine value	91.75	94.17	85.6	95.	98.4
Hehner value	94.87	95.34	—	—	95.86
(Percentage of insoluble acids)					
Reichert-Meißl value	0.484	1.60	—	—	—
Percentage of free acid as oleic	0.546	0.791	0.62	—	6.20
Cold test of the oil	+3° C.	+3° C.	+2° C.	—	+10° C.
Maumené Test	56.75° C.	—	—	49° C.	45.5° C.
Melting point of fatty acids	29° C.	34° C.	30° C.	29° C.	28° C.
Solidifying point of fatty acids	27.5° C.	32.5° C.	29° C.	25° C.	25° C.

The refined product is stated to be a very agreeable table oil for salads and general culinary purposes. When once the free acid has been removed from the crude oil, the product shows less tendency to become rancid than olive oil does. The author also regards the refined oil as fully equal, if not superior, to olive oil for pharmaceutical purposes.

Hazel-Nut Oil. A. Schöttler. (*Apoth. Zeitung*, 1897, 533, 534.) The fatty oil obtained by expression amounts to 50-55 per cent. of the nuts, and is very similar in its composition to oil of

almonds, as it consists chiefly of glycerides of oleic acid with only very small quantities of palmitic acid. Its fatty acids melt at 19–20° C. The specific gravity of the oil is 0.916 at 15° C., its saponification number 187, and Hübl's iodine number 87.

Morrhual. C. Gundlich. (*Journ. Pharmacol.*, iv. 223.) The author has examined the preparation met with in commerce under the name of "morrhual," which is asserted to contain the useful therapeutic constituents of cod-liver oil. He has obtained a very similar product as follows:—A sample of crude cod-liver oil, having a specific gravity of 0.923 and containing 95.15 per cent. of insoluble fatty acids, was neutralised and then treated with alcohol of 80 per cent. The alcoholic solution, when evaporated, yielded a product which had a specific gravity of 0.900 at 19° C., and congealed at 4° C. In these respects, as well as in its colour, odour, and taste, it corresponded with commercial samples of morrhual. The author therefore regards it as probable that the commercial product is prepared in a like manner from crude cod-liver oil of a similar kind.

Both morrhual and the crude cod-liver oil were found on examination to contain amines, of which there was a much larger proportion in the former than in the latter. It was also ascertained that a large proportion of the bases found in cod-liver oil were removed from it by the treatment with alcohol. Hence, the increase of these constituents in morrhual.

Detection of Japanese Wax and Tallow as Adulterants in Beeswax. L. S. Lugowsky. (*Journ. de Pharm.* [6], v. 296.) The suspected sample is heated with a solution of borax saturated in the cold; if tallow is present, a white turbidity is produced, and if Japanese wax is present, a milky liquid. When cold, a layer of fat will be found under the layer of wax. The tallow and Japanese wax may be further identified by liberating the glycerin from them, and oxidising it to formic acid by means of potassium permanganate.

Essential Oils. E. Gildemeister and K. Stephan. (*Archiv der Pharm.*, ccxxv. 582–592.) *Mandarin oil*, from *Citrus madurensis*, has a sp. gr. = 0.855 at 15°, and rotatory power $[\alpha]_D = +69^\circ 54'$ at 16°. It distils almost completely between 175° and 179°, and consists for the most part of right-handed limonene. The residue from the distillation, of which large amounts are now being worked up, appears to contain citral and citronellal.

Culilawan oil, from *Cinnamomum Culilawan*, has a sp. gr. = 1.051, and is soluble to a clear solution in three parts of alcohol; it

contains from 61-62 per cent. of eugenol, together with small amounts of methyleugenol, and a substance boiling at 100-125° (10 mm.), the constitution of which has not been definitely decided.

Rosemary oil contains pinene (right and left-handed) as a normal constituent, and also inactive camphene.

Oil from the berries of Schinus molle, L. has a sp. gr. = 0.8505, rotatory power $[\alpha]_D = +46^\circ 4'$ at 17°, and, with sodium nitrite and acetic acid, gives an intense phellandrene action. It consists of about a half per cent. of pinene, phellandrene (right mixed with a little left-handed) and carvacrol, not thymol, as Spica has stated.

Detection of Adulteration in Essential Oils. E. Gossart. (*Bull. Soc. Chim.* [3], xv. 597-609. From *Journ. Chem. Soc.*) When a mixture of liquids is added drop by drop, with certain precautions, to another liquid mixture, containing the same constituents, the former will not merge at once in the latter, but will assume a spheroidal state when the composition of the two liquids is nearly the same. When, however, the composition of the one differs from that of the other by more than a certain amount, the two liquids mix at once and will not exhibit the above phenomenon. Upon this fact, the author has based a method, to which he gives the name of *homeotropy*, for the detection of the adulteration of certain essential oils. In this method, the suspected oil is allowed to drop from a pipette into a specially constructed glass dish containing some of the essential oil of known purity, when, if pure, it will exhibit the spheroidal phenomenon above described. It is found, for example, that this phenomenon is only manifested by mixtures of oil of bitter almonds and alcohol, when these differ in composition by less than 2 per cent.; whenever oil of bitter almonds contains more than 3 per cent. of alcohol, a drop of the mixture invariably merges at once in the pure oil when added in the manner described by the author. In the case of mixtures of oil of bitter almonds and nitrobenzene, it is necessary, on account of the high viscosity of the liquid, to dilute with alcohol when applying this method. Estimations of any given adulterant may be made by adding to the genuine essential oil such measured quantities of the adulterant in question as will give rise to the spheroidal phenomenon with the impure liquid.

Oil of Bitter Fennel. E. Tardy. (*Journ. de Pharm.* [6], vi. 98-102.) This oil, obtained by distillation from French cultivated bitter fennel, was found to contain the following constituents: a dextrogyrate terebenthene, phellandrene, cymene, fenchone, estragol, anethol, anisaldehyde, anisic acid, a crystalline compound of

the formula $C_{13}H_{14}O_2$, melting at $213^{\circ}C.$, and anisic acetone, $MeO \cdot C_6H_4 \cdot CH_2 \cdot CO Me$.

Oil of Spike Lavender (*Lavendula Spica*). J. C. Umney. (*Chemist and Druggist*, lii. 166.) The author points out that some of the so-called spike lavender oils now met with in commerce differ from the pure oil in physical and chemical characters as well as in their odour. Some of these seem to contain a considerable admixture of rosemary oil of a low grade, possibly the Dalmatian variety, which has practically the same specific gravity and optical rotation as spike lavender oil. The author therefore advises purchasers of the latter to insist upon the following characters:—

Specific gravity at $15^{\circ}C.$, .905 to .915	} To ensure freedom from turpentine.
Optical rotation in a tube of 100 mm., from + 0 to + 7	
Soluble in 3 volumes of alcohol of 70 per cent. by volume	} To ensure freedom from rosemary oils.
Not less than 30 per cent. of alcohols	

Adulterated Oil of Star-Anise. J. C. Umney. (*Chemist and Druggist*, li. 623.) Parts of a recent consignment of this oil were found to differ materially from pure samples in their specific gravities and their melting points after solidification. The author's examination showed that these abnormal oils were adulterated with a light hydrocarbon (petroleum) oil of 0.835 specific gravity, which could be separated from the star-anise oil by treatment with strong sulphuric acid. The proportion of this adulterant in the different samples was found to vary from 41–46 per cent.

Genuine star-anise oil should have a specific gravity of not less than .980 at $15^{\circ}C.$, and should melt, after solidification, at a temperature not lower than $15^{\circ}C.$

Oil of Angostura Bark. H. Beckurts and J. Troeger. (*Archiv der Pharm.*, 1897, 518–535.) Angostura bark (*Galipea cusparia*) yields 1.5 per cent. of a volatile oil, which has a yellowish colour darkening with age, and an aromatic taste and odour; it is readily soluble in the ordinary organic solvents. By fractional distillation the authors have separated from it a sesquiterpene, $C_{15}H_{24}$, and an optically inactive alcohol, *galipene alcohol*, $C_{15}H_{26}O$, which boils at $265^{\circ}C.$, has a specific gravity of 0.9270 at $20^{\circ}C.$, and does not possess the characteristic odour of the oil. On heating with

acetic anhydride, this alcohol yields *galipene*, $C_{15}H_{24}$. As the crude oil is lævorotatory, the alcohol inactive, and the terpene dextrorotatory, the authors consider it probable that in the isolation of the terpene from the crude oil an inversion is effected, and that the terpene contained in the oil has a rotatory power different from that of the terpene obtained by means of acetic anhydride.

Oil of Basilicum. J. Bertram and H. Walbaum. (*Archiv der Pharm.*, cccxxv, 176-184.) A sample of this oil from the island of Réunion possessing a sp. gr. = 0.954 at 15° and a rotatory power = + 10° 12' (100 mm. tube) was first saponified, and the oil then submitted to fractional distillation. Under 10 mm. pressure, it boiled at 75-140°, the largest quantity distilling at 90-93°. In the various fractions, the presence of the following substances was proved:—(1) Dextrorotatory pinene in the fraction of low boiling point. (2) Cineol in the fraction boiling at 175-200°. (3) Dextrorotatory camphor was found in the fraction which boiled at 200-203°, and (4) methylchavicol in the large fraction boiling at 90-93°. Under atmospheric pressure, the last-named portion boils at 215-216°, has a sp. gr. = 0.969 at 15°, a rotatory power + 5° 57' (100 mm. tube), and a specific refraction $n_D = 1.51371$ at 20°. This fraction, on oxidation with potassium permanganate, yielded anisic and homoanisic acids, and by treatment with sodium ethoxide, anethoil was prepared, hence the presence of methylchavicol was inferred. The original oil was found to contain 60 per cent. of this compound.

A sample of German oil had a different odour, a sp. gr. = 0.909 at 15° and a rotatory power = - 21° 15' (100 mm. tube). The presence of cineol was proved, but no camphor could be obtained from the oil. Homoanisic acid was prepared by oxidation, but the oil contained only 24.11 per cent. of methylchavicol. The oil, however, seems to contain a third alcoholic constituent, for the fraction boiling at 200° on treatment with acetic anhydride and subsequent titration with alcoholic potash gave a saponification number which indicated an alcoholic content of 40 per cent. $C_{10}H_{18}O$. This alcohol, in the light of Dupont and Guerlain's work on French oil of basil (*Year-Book of Pharmacy*, 1897, 192), is probably linalool.

Oil of Buchu. M. Bialobrzewski. (*Pharm. Zeitschr. für Russl.*, xxxv, 353-358, 385-389, 401-405, 417-421, 433-436, 449-451. From *Journ. Chem. Soc.*) The light petroleum extracts of the leaves of *Barosma serratifolia* and those of *B. betulina*, contain an ethereal oil besides some chlorophyll and resin. The oil, of which 1.88 per cent. is obtained from the first-named leaves and

0.84 per cent. from the latter, is prepared by fractionating the acid petroleum extract under 14 mm. pressure to 130° and then distilling with steam. The resinous substance begins to boil at above 190° and has a brownish-green colour, an aromatic odour, and a bitter taste. After extraction with petroleum, the leaves, on treatment with cold alcohol, yield 3 per cent. of a brownish-green, bitter resin, insoluble in benzene and light petroleum. From the alcoholic extract of *B. serratifolia*, diosmin is deposited on the addition of sodium carbonate. Finally, by using hot 80-85 per cent. alcohol, a green acid extract is obtained which, on adding sodium carbonate, forms a precipitate of the sodium compound of diosmin, calcium carbonate, and manganese carbonate, from which diosmin is separated by treatment with 80-85 per cent. alcohol, washing with water containing 0.5 per cent. glacial acetic acid, and crystallising from hot alcohol. *B. betulina* yields 0.02 per cent. and *B. serratifolia* 0.045 per cent. of diosmin. This compound can also be obtained by washing the leaves with alcohol to which 0.2 per cent. of glacial acetic acid has been added.

The ethereal oil, which has a camphor and peppermint-like odour, boils at 178-235°, is very soluble in ether, alcohol, and benzene, and forms a green solution with ferric chloride. In the cold, it solidifies with separation of diosphenol—a phenol aldehyde which reduces oxide of silver and constitutes about 50 per cent. of the whole oil. Diosphenol may also be obtained by shaking the oil with potassium hydrate solution. In order to free the liquid portion of the ethereal oil from diosphenol, it is fractionated under 15 mm. pressure and the portion boiling at 120-125°, which solidifies and consists mostly of the phenol, is pressed between filter paper. All the liquid fractions are freed from diosphenol by repeatedly shaking with silver oxide until the oil obtained by distilling with steam after adding sodium carbonate gives no coloration with ferric chloride. The diosphenol is thus converted into the sodium salt of *diosphenotic acid*, $\text{OH} \cdot \text{C}_6\text{H}_4 \cdot \text{COOH}$, and is obtained as a white, amorphous, deliquescent powder insoluble in ether on treating the aqueous solution with animal charcoal, extracting with aqueous alcohol the white residue left on evaporation, again evaporating the solution, and drying in a vacuum. It can be further purified by washing with ether. Hydrochloric acid precipitates the acid from the sodium salt as a brown oil which may be purified to an almost colourless oil by converting it into the sodium salt and purifying this as above described. On fractionation under 14 mm. pressure, the liquid ethereal oil free from

diosphenol yields a small distillate boiling at 64–67°, and a larger one boiling at 96–99°. After drying with potassium carbonate, these fractions boil respectively at 174–176° and 206–209° under the ordinary pressure.

Diosphenol, $\text{OH} \cdot \text{C}_6\text{H}_{14} \cdot \text{CHO}$, on crystallisation from alcohol, forms lustrous, colourless crystals having an odour like that of camphor, melts at 82°, and boils at 232° under the ordinary pressure and at 112° under 14 mm. pressure. The *oxime* melts at 156°. The phenylhydrazine compound forms a blood-red liquid which solidifies at 0°, but was not obtained pure. On reduction with sodium in an aqueous ethereal solution, diosphenol yields the *alcohol* $\text{C}_6\text{H}_{14}(\text{OH}) \cdot \text{CH}_2 \cdot \text{OH}$, which melts at 159°.

By heating with alcoholic potash, diosphenol forms an *acid* which melts at 97°, and whose composition differs from that of diosphenolic acid by containing one more molecule of water.

The fraction of the oil boiling at 206–209° is a *ketone*, $\text{C}_{10}\text{H}_{18}\text{O}$, isomeric with menthone; it has a peppermint-like odour, and decolorises potassium permanganate solution. Its sp. gr. = 0.8994 at 18.5°, its specific rotatory power $[\alpha]_D = -6.12^\circ$. The *oxime* is a faintly green liquid of sp. gr. 0.9627 at 18.5°, boils at 134–135°, and has a specific rotatory power $[\alpha]_D = +2.19^\circ$. The bromine derivative, $\text{C}_{10}\text{H}_{17}\text{OBr}_3$, is a brown fuming liquid.

The fraction of the oil which boils at 174–176° corresponds with terpene in composition, has a sp. gr. = 0.8647 at 18.5°, a specific rotatory power $[\alpha]_D = +60.40^\circ$, and decolorises potassium permanganate and bromine.

Diosmin forms minute, tasteless, and odourless white or yellow needles, is soluble in hot alcohol, melts at 244°, and by the action of dilute sulphuric acid yields a carbohydrate and an uninvestigated substance which melts at 197°.

Composition of the Oil of *Monarda Fistulosa*. E. Kremers. (*Chem. Centr.*, 1897, ii. 41.) The volatile oil obtained by distillation from *Monarda fistulosa* has a brownish-red colour and a specific gravity of 0.941 at 20° C. It contains carvacrol, a small quantity of cymene, and a red crystalline substance melting at 219–223° C.

Oil of Cloves. E. Erdmann. (*Journ. prakt. Chem.*, lvi. 143–156. From *Journ. Chem. Soc.*) When oil of cloves is treated with an aqueous potash solution, a residue containing oxygen is left undissolved; this the author calls “échappés.” It has no constant boiling point, and its sp. gr. is lower than that of oil of cloves; when treated with alcoholic potash, there is a rise

in temperature, and on extracting with ether caryophyllene is obtained. The residual alkaline liquid contains eugenol and acetic acid. When "échappés" is distilled under a pressure of 12 mm. at a temperature of 142° , a solid substance collects in the receiver; this is found to be acetyleugenol, thus accounting for the fact that the portion of oil of cloves insoluble in dilute potash solution contains oxygen.

Thom's method for estimating the value of oil of cloves, and which presupposes the existence of free eugenol in the oil, gives numbers which are too low, because the acetyleugenol is only partially estimated when this method is employed; if, however, the oil of cloves be first saponified, the true value can be obtained.

When oil of cloves is treated with alcoholic potash, and the free alkali titrated with normal hydrochloric acid, using litmus as indicator, it is found that a greater amount of alkali has been used up than is accounted for by the presence of acetyleugenol; this is because salicylic acid is present in small amount, probably combined with eugenol as acetylsalicylic acid.

The author has further proved the presence of furfuraldehyde in oil of cloves.

Oil of *Levisticum Officinale*. R. Braun. (*Archiv der Pharm.*, cccxxv. 1-19. From *Journ. Chem. Soc.*) Oil of lovage (*Levisticum officinale*) has the characteristic taste and odour of the root. Its sp. gr. varies somewhat, the mean value = 1.0407 at 15° , and its refractive index = $1.5336-1.5337$. It is readily soluble in alcohol (96 per cent.), ether, light petroleum, chloroform, acetic acid, etc. Iodine has no action, but bromine converts the oil into a resinous mass; potassium also acts violently, and on the addition of water an orange-red emulsion is obtained. When warmed with platinic chloride, an odour of angelic acid is developed. The oil begins to boil at about 170° , but at 200° decomposition ensues; it was therefore distilled under diminished pressure, and the following fractions collected: (1) to 130° ; (2) $130-176^{\circ}$, mostly $170-176^{\circ}$; (3) $200-250^{\circ}$, coloured brown; (4) $250-300^{\circ}$, coloured green; (5) $300-360^{\circ}$, dark green. These temperatures are calculated to normal pressure. Fraction 5 solidified on cooling, and was found to contain benzoic acid. Fractions 1, 3, and 4 were very small, and could not be investigated. Fraction 2 was found to contain two compounds. One of these, $C_{10}H_{18}O$, boils at 178° , has a sp. gr. = 0.9176 at 15° , and a refractive index = 1.4825 ; in its physical properties, it resembles cineol, but does not yield crystalline additive compounds with hydrogen chloride or with bromine. The

second compound, $C_{10}H_{16}$, is best obtained by the prolonged action of alcoholic potash (30 per cent.) on the compound, $C_{10}H_{18}O$. It is a clear, colourless oil, with an odour resembling that of thyme; it boils at 176° , has a sp. gr. = 0.8534 at 15° , and a refractive index = 1.4777; it is dextrorotatory (+ 5°), and in many respects resembles limonene, but yields no crystalline additive compound with bromine. A resinous substance was also obtained by the action of alcoholic potash on the compound $C_{10}H_{18}O$. When fused with potash, acetic, isovaleric, and benzoic acids were found among the products formed.

The oil from fresh roots appears to differ in some of its physical constants from the oil from the dried roots. The green roots also, on distillation, yield little or no resin.

Irritant Action of Natural Oil of Wintergreen. M. Vidal. (*Nouv. Rem.*, xiii. 615.) Attention is called by the author to a hitherto unobserved difference between the natural and artificial oils of wintergreen. When applied externally, the natural oil was observed to cause irritation of the skin, in some cases even an eruption, while methyl salicylate had no such action. The presence of an irritant constituent in the natural oil is therefore surmised.

Rectified Oil of Turpentine. (*Pharm. Zeitung*, xlii. 430.) The German Pharmacopœia directs that, in the preparation of this oil, the distillation is to be stopped as soon as 75 per cent. of the oil employed have passed over. This is shown to involve an unnecessary waste, since it is found that a good commercial oil, when distilled with lime water as directed, yields fully 90 per cent. of a neutral resin—free distillate answering all requirements.

Oil of Turpentine as an Antidote to Phosphorus. M. Velter. (*Pharm. Centralhalle*, xxxviii. 172.) The author confirms the value of oil of turpentine as an antidote to phosphorus. He administers it in three successive doses of 3 grammes each, emulsified with water by means of gum arabic, and flavoured with syrup of orange.

Potassium Permanganate as an Antidote to Morphine. L. E. Sayre. (*Amer. Journ. Pharm.*, 1898, 109, 111.) The author reports upon several cases of morphine poisoning which were treated with potassium permanganate. The results of the treatment afford confirmatory evidence of the value of this antidote, the use of which was first suggested by W. Moor in 1894.

Antidotes to Arsenic. C. Glücksmann. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxvi. 181–185.) The author has investigated the

comparative merits of the chief antidotes to arsenious acid now in use, and arrives at the conclusion that magnesium hydrate prepared by precipitation is the best. He suggests the following directions for the extempore preparation of this antidote whenever it may be required:—50 grammes of magnesium sulphate are dissolved in distilled water, and the solution is made up to $\frac{1}{2}$ litre. 40 grammes of pure caustic soda are dissolved in distilled water, and this solution likewise is made up to the volume of half a litre. Both solutions are kept separately, and whenever needed, equal volumes of the two are mixed, and a “shake the bottle” label attached to the mixture. Separation of the precipitate from the liquid is entirely unnecessary, and would only cause delay. The presence of sodium sulphate in the antidote is not only no drawback but an actual advantage.

Antagonistic Action of Digitalis and Nitrites. C. R. Marshall. (*Journ. Physiol.*, xxii. 1–37.) The author has investigated the mutual antagonism in the action of digitalis and nitrites, and arrives at the conclusion that the power of the latter to counteract the effects of the former is much greater than the neutralising influence of digitalis on the action of nitrites.

Antidote to African Arrow Poison. (*Pharm. Journ.*, 4th series, v. 458.) According to a report from Uganda, Dr. Macpherson has made the important observation that an injection of a solution of strychnine has proved an efficient antidote for the arrow poison used in that district, which is the produce of a species of *Acokanthera*.

Cholesterol and Bile Salts as Chemical Vaccines for Snake Poison. C. Phisalix. (*Comptes Rendus*, cxxv. 1053–1055.) Attention was first drawn by Fraser to the power of bile to counteract the effects of snake poison. This observation is now confirmed by the author, who further shows that certain constituents of bile, viz. cholesterol and bile salts, have a similar action, and may be used with advantage as a vaccine. Their hypodermic injection appears to confer immunity to snake venom. The action of these substances is purely that of a vaccine, and not an antitoxic one. Heating to 120° C. and upwards destroys their action.

A Chemical Vaccine for Snake Poison. C. Phisalix. (*Comptes Rendus*, cxxvi. 431.) The author has recently shown that certain bile constituents (cholesterol and bile salts) are capable of exerting an immunising action on the venom of vipers (preceding

abstract). He now finds that this property is shared by tyrosin, a plant constituent occurring in the tuber of the dahlia, in certain species of *Russula*, etc. An injection of 2 or 3 c.c. of a 1 per cent. solution of this principle confers immunity to snake venom on a guinea pig after 24 hours, lasting for about three weeks. Dahlia juice produces the same action. When injected at the same time as the venom or afterwards, tyrosin entirely fails to act; its effect, therefore, is not antitoxic, nor that of an antidote, but merely that of a preventative. This is the first known instance of a plant juice possessing immunising properties in regard to snake poison.

Antagonistic Action of Iodothyrim and Atropine. E. von Cyon. (*Pfl. Archiv*, 1898, 511.) If a rabbit is atropinised so that stimulation of the vagus nerve produces no inhibition of the heart, the administration of iodothyrim neutralises momentarily this effect. This action of iodothyrim on the heart nerves confirms the previous opinion expressed by the author on the importance of the thyroid in relation to the heart.

Antagonistic Action of Sodium Iodide and Muscarine. E. von Cyon. (*Pfl. Archiv*, 1898, 634.) The author finds that sodium iodide, when injected intravenously, prevents the subsequent stimulating action of muscarine on the vagus endings, while muscarine prevents the paralysing action of sodium iodide on these nerve-endings.

The Bacillus of Yellow Fever. M. Sanarelli. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 569.) The *bacillus icteroides* consists of minute rods 0.002–0.004 mm. in length, generally 2 to 3 times as long as broad, with a rounded appearance at the ends. In cultures they are generally seen united in pairs. In the tissues of patients, and especially in the small blood vessels of the liver, kidneys, etc., they are generally found united in small groups, but their recognition presents considerable difficulty. The bacillus can be developed in various culture media, even in the absence of air. It produces a slow fermentation in milk, but no coagulation, and sets up a more energetic fermentation in the presence of glycerin and sugar. It perishes in water heated to or above 60° C. The direct rays of the sun destroy it within seven hours. In sea water it can exist for a long time without losing its vitality. It is still uncertain whether infection with yellow fever takes place through infected air or infected water, but the author is inclined to attribute it to the latter.

The Bacillus of Syphilis. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 517.) Prof. Döhle of Cologne is stated to have discovered the true bacillus of syphilis. He has obtained cultures of this micro-organism, by means of which syphilis could be readily imparted to animals.

The Bacillus of Whooping-Cough. H. Koplik. (*Centralbl. fibr. Bakteriöl. und Parasitenk.*, xxii. 1897, 228. From *Pharm. Journ.*) The author has isolated from the sputum of whooping-cough patients an anærobic bacillus which grows very luxuriantly. It is a mobile rodlet, 0·8 to 1·7 μ in length, and from 0·3 to 0·4 μ in breadth. It has some resemblance to the diphtheria bacillus.

Physiological and Therapeutic Effects of Spermine. A. Poehl. (*Comptes Rendus*, cxxv. 959-961. From *Journ. Chem. Soc.*) Spermine, $C_5H_{14}N_2$, occurs in almost all the organs of the body, and even when present in small quantities accelerates the oxidation of organic and inorganic substances in the same manner as a ferment (*Compt. Rend.*, 1892 and 1893). Many observers have found that when administered by ingestion or subcutaneous injection, it has beneficial effects in a very wide range of maladies. These effects the author attributes to its power of restoring or increasing intra-organic oxidations, facilitating the elimination of waste products and destroying antitoxins or toxins of microbic origin. He finds that, when it is administered, the ratio of nitrogen in the urea to the total nitrogen is restored to normal, or in other words, the injurious intermediate nitrogenous compounds are reduced in quantity. Direct experiment shows that the leucomaines and nitrogenous extractive substances in the urine diminish. The ratio of urea to chlorides also diminishes, notwithstanding the increase in the total quantity of urea; the ratio of uric acid to phosphoric acid is slowly restored to normal; the ratio of total phosphoric acid to neutral phosphates is distinctly reduced, and the consequent increase in the alkalinity of the blood is favourable to oxidation. On the other hand, spermine seems to have no influence on the intestinal fermentations, and the ratio of total sulphuric acid to sulphonic acids is not altered; it is therefore without effect on intestinal auto-intoxication.

Physiological Action of Cotarnine. P. Marfori. (*Chem. Centr.*, 1897, ii. 368.) Cotarnine first stimulates and then paralyzes the nerve centres. It does not owe its hæmostatic action to an acceleration of the coagulation of the blood, nor to vaso-constrictive properties, and differs in this latter respect from hydrastinine to which it stands in close chemical relation.

Physiological Action of Choline, Neurine, and Allied Substances. F. W. Mott and W. D. Halliburton. (*Proc. Physiol. Soc.*, 1898, 34, 35. From *Journ. Chem. Soc.*) Compare *Year-Book of Pharmacy*, 1897, 198. In a previous communication it was shown that cerebro-spinal fluid removed from cases of brain atrophy (particularly from cases of general paralysis of the insane) produces a fall of blood-pressure. The material in the fluid that produces this effect is not proteid, nor is it of inorganic nature, but is precipitable by phosphotungstic acid, and is therefore probably alkaloidal. Dilute solutions of choline hydrochloride produce the same effect on blood-pressure. The related alkaloid neurine produces a different effect, a preliminary fall of pressure being usually followed by a marked rise.

The present research shows that the substance in the cerebro-spinal fluid which produces the effect is choline, characteristic crystals of the platinochloride having been prepared from the fluid.

The fall of blood-pressure which occurs is only partly of cardiac origin. There is slowing of the heart, but this is often not very marked, and as tracings with Barnard's cardiometer showed, is accompanied with an increased output.

The main cause of the fall is vascular dilatation. This was investigated by the use of air-plethysmographs. In the case of the limbs there is no evidence of active dilatation; the volume of the limb is, in fact, slightly diminished; this appears to be secondary to the general fall of arterial pressure. The same is true for the kidney; the lever of the kidney oncometer falls with the blood-pressure. In the case of the intestines, however, there is marked vascular dilatation.

Although the principal interest in this work centres round the fact that the toxic material in the specimens of cerebro-spinal fluid in question is choline, a good many experiments have been made on neurine as well. The primary fall in the arterial pressure is of cardiac origin; the slowing of the heart and deepening of the respiration are very marked symptoms; usually this is followed by a rise of pressure, due to constriction of peripheral vessels. In some cases this latter phase is absent, and the heart remains permanently slowed, whilst in some few cases, using small doses (1 or 2 c.c. of a 0.1 per cent. solution of the hydrochloride), there is only the second phase, a rise of pressure with peripheral constriction of the intestinal and kidney blood-vessels.

Physiological Action of Piperidine, Coniine and Nicotine. B. Moore and R. Row. (*Journ. Physiol.*, xxii. 273-295.) The

alkaloids mentioned are similar in physiological action, and they all contain a reduced pyridine (or pyrroline) ring. Intensification of the action is due to the introduction of an organic radicle as a side group.

Motor paralysis (in frogs) is due to an effect on the intramuscular part of the motor nerves; the excised heart is slowed and the systole prolonged. The heart *in situ* in mammals is at first slowed. The arterial blood-pressure is raised, owing to constriction of the arterioles, this being probably due to vaso-motor excitation in peripheral ganglia; at a certain stage this mechanism is paralysed, further administration of the drugs no longer affecting blood-pressure.

Note on the Physiological Action of Guaiacolate of Piperidine. F. W. Tunncliffe. (*Journ. Chem. Soc.*, 1898, 145.) This substance has already been introduced into medicine, and has been found to be of considerable service in phthisis. It forms a relatively soluble salt, and can be given either in solution or in the solid form. It has none of the irritant properties of guaiacol, and it appears very probable that the piperidine not only neutralises these irritant properties, but exerts its own specific action as a vascular and nerve tonic. The importance of a vascular tonic in the treatment of the infective granulomata (tuberculosis) has recently been emphasised by Liebreich, who has found cantharidin to be of great service both in the treatment of pulmonary tuberculosis and lupus; the principal action of this substance is attributed by Liebreich almost entirely to its vascular tonic action. The combination, therefore, of a very powerful vascular tonic such as piperidine with an antiseptic like guaiacol is regarded by the author as a distinct pharmacological advance, and the practical results obtained with this substance, although at present few, seem to prognosticate for it a distinct place amongst the remedies for consumption.

Physiological Action of Globularin and Globularetin. M.M. Moursou and Balestre. (*Nouv. Rem.*, 1897, 737.) Globularin, $C_{30}H_{44}O_{14}$, is the bitter glucoside of *Globularia alypum*, and yields on boiling with dilute acids glucose and globularetin, $C_{12}H_{14}O_3$. In order to throw light on the therapeutic value of these principles in the treatment of rheumatism, gout, typhoid fever and pneumonia, the author has investigated their physiological action. He arrives at the following conclusions:—

Globularin stimulates the heart and nervous system in a similar manner as caffeine; it diminishes diuresis and the specific gravity

of the urine. Globularetin, on the other hand, increases diuresis and the quantity of solid constituents in the urine. This effect continues for some time after the administration of the remedy is suspended. While small doses have a stimulating action on the kidneys, larger ones lead to a congestion of this organ and of the entire urinary system, without, however, producing albuminuria. Globularetin also increases the secretion of bile and induces diarrhœa. The administration of excessive doses causes strong intestinal irritation.

Convallamarin in Chloroform Narcosis. (*Therap. Gaz.* [3], xiii. 674.) Observations on the cardiac action of convallamarin have induced Loewenberg to suggest the use of this remedy for preventing the stoppage of circulation during the administration of chloroform in surgical operations.

Amyl Nitrite in Chloroform Syncope. (*Brit. Med. Journ.*, ii. 97.) The use of amyl nitrite, in addition to artificial respiration, is strongly recommended by Walker in cases of threatened collapse under the influence of chloroform. He reports upon a case in which life was thus saved after an apparently hopeless condition had already set in.

Therapeutic Properties of Ethylamine. C. Goldschmied. (*Chem. Zeitung*, 1897, 544.) The author calls attention to the great ease with which the urate of this base is soluble in water, even at an ordinary temperature. He suggests that it may prove very useful in gout, calculus, and uric acid diathesis generally.

Urea as a Remedy in Gout. P. Carles. (*Répert. de Pharm.*, 1897, 337.) It has been already shown that urea is a very good solvent of uric acid, and that it possesses marked diuretic properties (see *Year-Book of Pharmacy*, 1896, 158, and 1897, 199). For its internal administration as a diuretic and lithontriptic, the author recommends a gradual increase from 10 grammes to 25 grammes per day, and suggests milk as a vehicle for disguising the taste. The treatment may be continued for two or three weeks. Its use is contra-indicated in organic kidney diseases and in cirrhosis of the liver.

The author considers the fact that urea is so readily tolerated even in large doses as a proof that the auto-intoxication of uræmic patients is not directly due to the retained urea, but to other products, chiefly ptomaines.

Oil of Cajuput in Pneumonia. (*Therap. Gaz.* [3], xviii. 332.) Five-minim doses of this oil, given in the form of an emulsion, have

been administered with marked success to patients suffering from croupous pneumonia.

Cinnamic Acid in Tuberculosis. T. Heusser. (*Therapist*, September 15th, 1897.) The author states that the theory upon which the method of using cinnamic acid is based was propounded by Landerer in 1888. The important points to be noted in the treatment are: (1) Induction of general leucocytosis. (2) Aseptic inflammation of the tuberculous centre, commencing with a circumvention and permeation of the tubercles with leucocytes, subsequently with young vessels and vascular tissue. To bring about these conditions, Landerer used an intravenous injection of an emulsion of cinnamic acid; but the author prefers to use gluteal injections of the emulsion on account of the danger attending the former method of administration. He uses a minim and a half of a 5 per cent. emulsion at the beginning, and increases the dose gradually with each injection. If the symptoms are favourable, these are made every second day. The maximum dose is 15 grains, and is continued until the end of the treatment, which is continued for a month after all symptoms disappear.

In summarising his opinions with regard to his experience with this treatment, the author states that: (1) Cinnamic acid is a drug having great influence on tuberculosis. (2) The gluteal cinnamic acid injections, if cautiously made, are absolutely innocuous. (3) The gluteal cinnamic acid treatment is capable of curing a considerable number of cases of pulmonary tuberculosis. (4) Cinnamic acid is not a specific against tuberculosis.

Sulphonal as an Antisudorific in Phthisis. (*Med. Chron.*, viii., 57.) According to Combemale and Descheemayer, sulphonal is a very efficient remedy for relieving the night-sweats of phthisical patients. 15 to 30 grains are given daily at bedtime, and may be continued for a week or a fortnight.

Ichthyol in Phthisis. (*Rev. Méd. Pharm.*, iv. 234.) In addition to its numerous other uses ichthyol is now also establishing a reputation as a remedy in phthisis, especially in the earlier stages of this disease. It appears to promote expectoration, to stop or diminish the night-sweats, and to improve the general tone of the system. In the opinion of Fränkel, who has tried it extensively, its beneficial action is superior to that of guaiacol or creosote. It is given in doses of 0·5 gramme three or four times daily, either in gelatin capsules, or in a solution flavoured with oil of peppermint to disguise its taste.

Ichthyol in the Treatment of Small-Pox. (*Amer. Journ. Pharm.*, from *Therap. Gaz.*, November, 1897.) Cassenko recommends ichthyol as a local application in variola. The remedy was used as an ointment, made as follows:—

R.	Ichthyol	.	.	.	.	.	10 parts.
	Fat	.	.	.	.	.	60 "
	Lanolin.	.	.	.	.	.	20 "

The lanolin may be replaced by chloroform, olive oil, or glycerin, according to the individual case. The ointment was applied three times a day as soon as the papules became visible. As a result there was little or no tenderness at the seats of eruption, the temperature never rose high, and the desquamation was almost completed in three or four days from the maturation of the eruption.

Creosote in Habitual Constipation. (*Lancet*, 1898, 97.) Holstein points out that although small doses of creosote have no laxative action, they are well suited for relieving habitual constipation. One drop doses are given in water or milk twice a day after meals, the dose being gradually increased after the first few days.

Benzoïn in Pertussis. (*Therap. Gaz.* [3], xiii. 677.) This remedy has been tried extensively by Ecross in whooping-cough, generally with very good results. It is applied by blowing the finely powdered drug into the pharynx and up the nostrils.

Thyroid Extract as a Galactagogue. (*Therap. Gaz.*, xxii. 49.) Recent observations by Dr. Stawell seem to indicate that thyroid extract has, in addition to its other therapeutic properties, a well-marked galactagogue action. The milk secreted under its influence is found to be perfectly normal in composition and character.

Physiological Action of Tannin and Gallic Acid. E. Harnack. (*Zeitschr. für physiol. Chem.*, xxiv. 115-124.) By administering to men or dogs small, medicinal doses of tannin or gallic acid, the quantity of gallic acid found in the urine is very small, but the greater amount is eliminated with the fæces. It is probable that some of the gallic acid which passes into the urine is decomposed, and traces of pyrogallol are found, if, in searching for it, the acidified urine has been evaporated; if the evaporation is omitted, pyrogallol is never found. Pyrogallol is highly poisonous, and is not formed in the organism.

On giving larger doses of gallic acid, more passes into the urine, especially if alkalies are given as well.

By feeding on free tannin, none passes into the urine; but it is

found after giving a freshly-prepared solution of tannin in alkali. For the isolation of tannin, the salting-out method by saturated sodium chloride solution, and precipitation by solution of gelatin or albumin free from globulin, is recommended. The separation of small quantities of pyrogallol and gallic acid may be accomplished by taking advantage of the solubility of the former in boiling benzene.

The Toxic Action of Acetylene. U. Mosso and F. Ottolenghi. (*Real. Accad. Linc.* [5], v. 324-331. From *Journ. Chem. Soc.*) The authors have made numerous experiments on the toxic action of acetylene on dogs, rabbits, rats, sparrows, frogs, tritons, and newts. The dogs, rabbits, rats, and sparrows were placed in an atmosphere of acetylene, either pure or mixed with air; pure acetylene was also introduced into the lungs of dogs by means of a canula inserted in the trachea. Frogs, tritons, and newts were placed in the gas and in water saturated with acetylene.

The authors conclude that acetylene is highly toxic. The inhalation of 500 c.c. of the pure gas is fatal to dogs unless energetic artificial respiration is resorted to; air containing 20 per cent. of the gas is always fatal to dogs left in it for an hour. Acetylene present in air in small proportion gives rise, in animals, to a period of excitement followed by one of paralysis, during which cardiac and respiratory failure are observed; paralytic symptoms then supervene and death occurs without convulsions.

Sodium Sulphite in Bronchitis. (*Bull. Gén. de Thérap.*, ii. 573.) This salt is recommended by Dumas in chronic fetid bronchitis and in pulmonary gangrene, and is given by him in aqueous solution sweetened with simple syrup. He states that under its influence the fetid odour disappears, and excessive expectoration is diminished. This remedy is contra-indicated in cases predisposed to hæmoptysis and when large cavities exist.

Hæmostatic Properties of Sodium Sulphate. F. Reverdin. (*Thérap. Gaz.* [3], xiii. 408.) The author reports that small doses of sodium sulphate, two grains every hour, are of great service in certain cases of capillary hæmorrhage, and are also useful in graver cases. Subcutaneous administration does not produce the same result.

Sodium Salicylate in Hæmoptysis. (*Bost. Med. Surg. Journ.*, cxxxvii. 90.) According to Mays, this salt and other salicylates are very beneficial in many cases of hæmoptysis. They are supposed to act by removing toxins from the blood or rendering them harmless.

Therapeutic Application of Copper Arsenite. (*Pediatrics*, iii. 427.) Teaspoon doses of 1 per 1,000,000 solution of copper arsenite, given every 10 or 15 minutes, are found by Krüger to prove highly beneficial to children suffering from acute infectious gastro-intestinal catarrh. The treatment may be assisted by giving a teaspoonful of iced milk every half-hour between the doses of the arsenite. The dose of the latter may afterwards be increased to $\frac{1}{800}$ th of a grain given every hour. As a rule, the total quantity given within 24 hours need not exceed $\frac{1}{60}$ th of a grain.

Therapeutic Value of Organic Bismuth Salts. R. W. Wilcox. (*Med. Chron.*, vii. 452.) The author has continued his researches on the therapeutic value of the organic bismuth salts, some of which he finds to be valuable remedies. Bismuth-naphtholal, a combination of bismuth oxide and β -naphthol, containing 20 per cent. of the latter, has given excellent results in cases of typhoid, intestinal putrefaction, and in the diarrhoea of phthisis. It is given in doses of 60 to 120 grains per diem. Bismuth tribromo-carbolate has also been tried and found useful in gastric fermentation in daily doses of 90 to 120 grains. Bismuth tetraiodo-phenolphthaleinate, or "eudoxine," was also successfully employed as an intestinal disinfectant. The author regards the organic salts of bismuth as greatly superior to the inorganic combinations usually prescribed.

Therapeutic Properties of Thallium Acetate. (From *Klin. Therap. Wochenschr.*) This salt is recommended by Combemale for checking the night sweats of phthisical patients. It is administered in the form of pills in daily doses of 0.1 gramme, occasionally up to 0.2 gramme, and should never be given for more than four consecutive days, since the effect produced in that time lasts about 8 or 10 days. With such doses no toxic action was observed in any case, but in a few instances the treatment caused the loss of the entire hair.

Manganese in the Treatment of Dysmenorrhœa. M. Donovan. (*Med. News*, November 27th, 1897.) The cases reported upon by the author supply evidence of the value of manganese in the treatment of dysmenorrhœa. It was given in pill form, in doses of 1 to 5 grains of the dioxide, three times a day after meals. In some cases it was combined with dried sulphate of iron and extract of nuxvomica.

Probable Therapeutic Importance of Manganese Salts. A. Villiers. (*Comptes Rendus*, cxxiv. 1349.) In view of recent observations that manganese salts, even in very small quantities,

promote the action of oxidising agents, and that glucose, sucrose, and carbohydrates generally as well as numerous other organic substances, are readily oxidised under such conditions, the author considers it probable that these salts may prove valuable in the treatment of certain diseases, such as anæmia, gout, and diabetes, which result from defective physiological oxidation.

The Alleged Incompatibility of Antipyrine and Spirit of Nitrous Ether. C. Caspari. (*Pharm. Rev.*, 1898, 12.) The green coloration developed in solutions of antipyrine by nitrites in the presence of a free acid may be discharged or prevented by neutralizing the free acid with a small quantity of alkali. In medicinal mixtures this neutralization should be effected by an alkaline bicarbonate, as antipyrine, though liable to decomposition in contact with alkaline hydrates or monocarbonates, is not changed or affected by bicarbonates. With a slight addition of this kind, spirit of nitrous ether and antipyrine may therefore be safely dispensed together.

Acetic Acid as a Menstruum. E. H. Squibb. (*Amer. Journ. Pharm.*, 1898, 351, 352, from *Ephemeris*, 1898, 1938.) The author states that recent experience has fully confirmed the value of acetic acid as a menstruum for the exhaustion of crude drugs containing active principles. By means of it thoroughly representative extracts can be obtained, containing only a very slight excess of acetic acid such as may be practically disregarded. These extracts, as a rule, are very permanent, and show no signs of deterioration even after months. The acid may with advantage replace alcohol in the preparation of fluid and solid extracts from almost all classes of crude drugs, including those containing oleo-resins. The ready miscibility of these acetous extracts with water without precipitation, together with the strength and uniformity that can be obtained by the use of this solvent, counterbalances the objection that may be raised against the small excess of acetic acid in the finished extract, while the greatly decreased cost of production is certainly an additional item in their favour.

The Solvent Action of Proof Spirit and Acetic Acid on Colchicum Seeds. R. C. Cowley and T. P. Catford. (*Chemist and Druggist*, lii. 229.) The author has previously reported on the comparative merits of these two solvents as menstrua for the extraction of colchicum corm (*Year-Book of Pharmacy*, 1897, 216). He has now extended his experiments to colchicum seeds, and finds that in the case of these, like in that of the corm, acetic acid

presents no advantage over weak spirit as a solvent of the alkaloid of the drug. Details of the experiments will be found in the original paper.

Acetone as a Solvent in preparing the Official Resins. E. T. Hahn. (*Amer. Journ. Pharm.*, 1898, 21-23.) The author has investigated the comparative merits of acetone and alcohol as solvents for the extraction of the resins of jalap, podophyllum and scammony. He reports that while there was no marked difference in the quality and characters of the resins extracted in the case of each drug by means of the two solvents, a notably larger yield of resin was obtained from jalap and podophyllum by extraction with acetone than by the use of alcohol.

Preparation of Syrups by Percolation. J. K. Williams. (*Amer. Journ. Pharm.*, January, 1898.) The author suggests a modification of the U.S.P. method of preparing syrups by percolation. In place of the plug of sponge, which is directed to be pressed down into the neck of the percolator, he inserts a grooved cork in the neck, and over that he places "a thin, broad piece of fine sponge, with a nipple-shaped projector, double the thickness of the rest, in the centre, to rest on the cork, serving as a diaphragm." A wedge-shaped stick is used to level and loosen the sugar in the bottom of the percolator, when nearing the end of the process, so that the dropping is maintained uniformly to the end and no channels are formed. Loaf sugar is preferred, and it is recommended that, as soon as the fluid begins to drop, the orifice should be closed for twelve hours, so that the sugar may be partially dissolved before percolation is allowed to proceed.

A Simple Apparatus for Preparing Cod-Liver Oil Emulsion. J. K. Williams. (*Chemist and Druggist*, li. 464.) The author makes use of a narrow tin or earthenware vessel, which he fits with a wooden cover, dasher, and handle, like an old-fashioned churn. The interior being quite dry, 3 ounces of powdered acacia, 16 fluid ounces of cod-liver oil, and a sufficient quantity of any desired flavouring essence are placed in the vessel and mixed with a spatula; 9.5 fluid ounces of water are added all at once, the dasher and cover fixed in position, taking care that the former is quite below the surface of the liquid, and the mixture is then vigorously churned until a perfect emulsion resorts.* The remainder of the water or other liquids are now slowly added while the churning is continued. No oil must be added at this stage, and no oily measure should be used for measuring the other liquids

without previous cleaning. The same apparatus is equally applicable for emulsifying other oils.

Preparation of Emulsions by means of Condensed Milk. (*Pharm. Zeit.*, xlii. 216.) Either cod-liver oil or castor oil may be readily emulsified with condensed milk, the best proportion being 3 parts of the latter to 8 parts of oil. The oil is added very gradually to the condensed milk in a mortar, and after a perfect emulsion has been obtained, 3 parts of simple syrup and 2 parts of water are added.

Notes on some of the Official Extracts. E. H. Farr and R. Wright. (*Pharm. Journ.*, 4th series, v. 517-519, and *Chemist and Druggist*, li. 908.) The authors direct attention to the fact that many of the official extracts are much overloaded with inert matter and are thereby rendered weak and less active, a defect which is particularly striking in the so-called green extracts prepared from plant juices. Some of the latter (juices) have been previously shown by them to be lamentably deficient in active principles. In order to remedy the defects referred to the authors plead in favour of extracts prepared from dried drugs of good quality by alcoholic extraction and subsequent evaporation of the tincture at a low temperature. Their experiments extend to the extracts of aconite, belladonna, conium, colchicum, hyoscyamus and stramonium. In each case they first determined the percentages of alkaloid, moisture, and alcohol-soluble portion in commercial juice extracts, and then compared the results with those obtained in the assay of the corresponding extracts prepared from the dried drug by exhaustion with alcohol. The chief results thus obtained are arranged for comparison in the form of tables. The final conclusion arrived at by the authors is that the alcohol-prepared extracts are better than the official extracts now in use. They compare favourably with the latter with regard to appearance and aroma, and are superior to them in alkaloidal strength. Owing to their greater strength, they are efficient in smaller doses. With regard to individual extracts, it is shown that aconite root yields a much more active extract than the leaves; and further, that the use of acetic acid in the preparation of extract of colchicum affords no advantage whatever as compared with the result obtained with alcohol only. The latter observation confirms the opinion previously expressed by R. C. Cowley on the same subject (see *Year-Book of Pharmacy*, 1897, 216).

TABLE I.

Showing Percentage of Alkaloid, Dry Extract, etc., in Commercial Juice Extracts.

Extract.	Alkaloid.	Moisture.	Dry extract.	Dry alcoholic extract.
Aconite (1)	20	29.6	70.4	33.8
" (2)	24	22.9	77.1	57.0
" (3)	28	29.4	70.6	40.8
" (4)	60	21.5	78.5	46.7
" (5)	62	22.4	77.6	48.5
" (6)	66	19.5	80.5	65.0
Average	43	24.2	75.8	48.6
Belladonna (1)	52	24.9	75.1	46.2
" (2)	90	25.7	74.3	41.2
" (3)	92	29.6	70.4	42.0
" (4)	110	24.8	75.2	52.4
" (5)	121	26.8	73.2	53.1
" (6)	133	25.6	74.4	54.0
Average	98	26.23	73.77	41.5
Conium* (1)	04	26.7	73.3	37.5
" (2)	20	21.6	78.4	37.0
" (3)	32	28.0	72.0	51.8
" (4)	52	25.2	74.8	39.0
" (5)	64	29.5	70.6	39.8
" (6)	70	23.6	76.4	38.6
Average	40	25.8	74.2	40.6
Colchicum (1)	78	24.1	75.9	49.6
" (2)	78	21.5	78.5	46.8
" (3)	86	19.6	80.4	48.2
" (4)	100	30.9	69.1	56.0
" (5)	104	24.1	75.9	59.2
" (6)	160	25.2	74.8	51.4
Average	101	24.2	75.8	50.2
Colchicum (acetic) (1)	62	22.0	78.0	43.6
" " " " (2)	91	24.6	75.4	46.4
" " " " (3)	96	23.9	76.1	55.2
" " " " (4)	98	25.1	74.9	49.0
" " " " (5)	100	36.3	63.7	45.6
" " " " (6)	112	28.1	71.9	68.2
Average	93	26.6	73.4	51.3
Hyoscyamus (1)	13	26.0	74.0	36.8
" (2)	14	29.3	70.7	37.6
" (3)	15	27.5	72.5	44.2
" (4)	15	22.9	77.1	37.6
" (5)	16	27.9	72.1	42.6
" (6)	18	26.0	74.0	35.4
Average	15	26.6	73.4	39.0

* The alkaloids were weighed as hydrochlorates.

TABLE II.

Showing Average Percentage of Alkaloid, etc., in (1) Juice Extracts, (2) in Alcoholic Extracts, with Approximate Average Yield of the latter.

Extract.	Alkaloid.	Moisture.	Dry extract.	Yield per lb.
Aconite (1)	·43	24·4	75·6	—
(2) Leaf	·60	17·0	83·0	2½ ozs.
(3) Root	2·44	20·8	79·2	4 ”
Belladonna (1)	·98	26·2	73·8	—
(2)	2·86	20·2	79·8	4 ”
Conium (1)*	·40	25·8	74·2	—
(2)	·30	17·7	82·3	2½ ”
(3) Fruit	8·13	18·6	81·4	—
Colchicum (1)	1·01	24·2	75·8	—
(2) Cornu	1·67	20·5	79·5	2¾ ”
(3) Seed	3·16	18·2	81·8	2 ”
Colchicum, Acetic (1)	·93	26·6	73·4	—
(2) Cornu	1·67	19·3	80·7	2¾ ”
(3) Seed	2·93	17·7	82·3	3 ”
Hyoscyamus (1)	·15	26·6	73·4	—
(2)	·30	18·0	82·0	4 ”
Stramonium (1) Leaf	1·54	19·4	80·6	2 ”
(2) Seed	2·73	16·8	83·2	—

Examination of some Commercial Powdered Extracts of Liquorice. C. O. Kintzey. (*Amer. Journ. Pharm.*, 1898, 23-25.) The author effects the estimation of glycyrrhizin by extraction with a solvent consisting of a mixture of 40 c.c. of solution of ammonia (0·96 sp. gr.), 240 c.c. of alcohol (0·797 sp. gr.), and 720 c.c. of water. After extraction, the glycyrrhizin is precipitated from the resulting solution by means of dilute sulphuric acid. The details of the process are as follows :—

One gramme of the extract is treated in a beaker with 25 c.c. of the solvent previously mentioned. The mixture is frequently stirred during an hour, and then allowed to stand for about twelve hours, and allowed to settle. The supernatant liquid is decanted upon a weighed filter, the residue in the beaker treated with 5 c.c. more of the solvent, allowed to settle again, decanted as before, and the insoluble matter transferred to the filter and washed until the washings passed through colourless. The filter with the insoluble residue is then placed in an air-bath and dried at 100–110° C.

The filtrate from the above is acidified with dilute sulphuric

* The alkaloids were weighed as hydrochlorates.

acid, which precipitates the glycyrrhizin as a dark-brown scale, which coagulates on standing. The precipitate is collected on a weighed filter, washed with water slightly acidified with acetic acid until all the sulphuric acid is washed out; it is then dried in an air-bath at 105° C., and weighed.

The following results were obtained in the examination of a number of commercial specimens of the extract:—

Manufacturer.	Brand.	Moisture.	Ash.	Insoluble Matter.	Glycyrrhizin.
1	Spanish . . .	6.52	3.70	36.52	6.40
2	Greek . . .	6.26	8.18	22.06	14.89
2	Spanish . . .	5.00	5.51	25.54	10.75
3	American. . .	5.62	6.79	12.27	7.63
3	Spanish . . .	7.08	6.52	29.20	5.28
4	Spanish . . .	6.96	6.56	20.35	10.41
4	Greek . . .	6.71	7.82	9.65	18.59
5	—	7.96	5.77	15.21	8.90
5	—	8.25	5.54	7.40	27.78
5	—	8.46	4.67	19.41	9.50
5	—	9.19	6.76	11.12	8.94
6	—	5.78	7.49	5.95	11.63

Fluid Extract of Liquorice. P. Boa. (*Chemist and Druggist*, lii. 309.) The author describes a number of experiments undertaken with the object of testing the merits of the present official process for preparing this extract. He finds this process, with a few slight modifications, to be a satisfactory one, and preferable to that of the U.S.P. He prefers percolation to the present process of maceration and expression. The principal difficulty encountered in percolating the drug with water alone is that the percolate is liable to become acid before extraction is complete. It is suggested that this may be overcome by adding just a sufficient quantity of ammonia to the aqueous percolate to preserve its alkalinity while percolation is proceeding. This simple expedient prevents the loss of sweet principle during percolation. The author is opposed, however, to the use of ammonia in the extraction of the root, which he finds both unnecessary and objectionable. It is not required for extracting the sweetness of the drug, but may be used with advantage for preserving the sweetness after extraction. Finally, in summarising his views on the subject, the author states that water is the best menstruum for extracting the sweetness of liquorice. If percolation of a rougher powder were substituted for double maceration and expression of the root in No. 20 powder

as directed in the official formula, it would make the process more satisfactory. Ammonia might be judiciously employed in the manner already referred to to prevent loss of sweetness, and a slight increase in the spirit would ensure preservation and produce a cleaner extract.

Liquid Extract of Taraxacum. A. J. Dey. (*Pharm. Journ.*, 4th series, vi. 179, and *Chemist and Druggist*, lii. 308.) The author has examined seven commercial samples of this extract, and has obtained results showing a great want of uniformity in strength, etc., as may be seen from the subjoined table, in which A represents a standard sample made from dandelion root of good quality, in strict conformity with the official directions.

No.	Sp. Gr.	Alcohol, per cent. by vol.	Extractive from 1 fl. oz. in grains.	Copper.
A	1.064	27.95	91.	Absent
1	1.002	35.35	47.5	Distinct
2	0.992	30.65	29.3	"
3	1.094	27.04	100.5	"
4	1.088	23.19	121.8	Abundant
5	1.010	19.37	25.	Distinct
6	1.046	40.84	110.8	Trace
7	1.064	30.65	73.	"

Assay of Liquid Extract of Belladonna. H. Wilson. (*Pharm. Journ.*, 4th series, vi. 450.) The author describes a number of experiments, the results of which have led to the suggestion of the following modification of the official process for the assay of liquid extract of belladonna:—

Mix 10 c.c. of the strong percolate with 10 c.c. of water, and very slightly acidify with sulphuric acid; evaporate in a porcelain dish to the consistence of a thin syrup. Add 20 c.c. of water and filter through a plug of cotton wool into a separator, washing the dish and filter with 30 c.c. of water. Now add 10 c.c. of a mixture of ether and chloroform (equal volumes) and excess of ammonia; agitate, separate the ether-chloroform solution; twice repeat the operation and separate as before. Shake the mixed ether-chloroform solutions with 5 c.c. of dilute sulphuric acid mixed with twice its volume of warm water, separate and repeat the operation. Wash the mixed acid solutions with 3 c.c. of ether-chloroform; then agitate with 10 c.c. of ether-chloroform and excess of solution of ammonia. Separate the ether-chloroform solution, and twice repeat the agitation and separation as before.

Place these solutions in a tared dish, evaporate on a water-bath, dry below 100°C ., and weigh. Dissolve this residue in 10 c.c. of decinormal solution of hydrochloric acid, and add centinormal solution of sodium hydrate until the solution is neutral, using tincture of cochineal as indicator. Deduct the measure of soda solution required from 100 c.c. and multiply the remainder by $\cdot 00287$. The product will be the weight in grammes of alkaloids present in 10 c.c. of the liquid extract. This figure should not differ by more than $\cdot 01$ gramme from that obtained by titration. From the quantity of alkaloid found by titrating, calculate the amount present in the bulk of strong percolate and add to the latter sufficient of the alcoholic menstruum to make it contain $0\cdot 75$ gramme of alkaloid in 100 c.c.

Liquid Extract of Belladonna. J. J. Bryant. (*Chemist and Druggist*, lii. 768.) The author's experiments show that the new official process for the preparation of this liquid extract involves a loss of alkaloids. Two pounds of the root were taken, and from it $12\frac{1}{2}$ fluid ounces of liquid extract were prepared by the re-percolation process, the official directions being strictly followed. The respective mares of the four portions into which the root was divided were next percolated to exhaustion with the same menstruum, and the amount of alkaloid in each liquor thus obtained was determined by the B.P. method, with the following results:—

2 lbs. powdered belladonna-root divided into four portions.	Alkaloid.		Volume of percolate, B.P. process, after leaving each portion.
	The amount obtained by percolation of the mares.	Percentage loss of alkaloidal content.	
1st portion .	0.053	4.392	49 fl. oz.
2nd „ .	0.096	7.956	37 „
3rd „ .	0.125	10.360	25 „
4th „ .	0.641	53.128	$12\frac{1}{2}$ „
Total . . .	0.915	18.959 by B.P. assay	
Total . . .	1.062	22.005 by difference	

The $12\frac{1}{2}$ fl. oz. of percolate assayed $3\cdot 764$ of alkaloid, or $1\cdot 06$ gramme per 100 c.c., so that when made up to the required standard ($0\cdot 75$ gramme per 100 c.c.) the product measured $17\frac{1}{2}$ oz. 1 dr. 20 mins.

The following method of preparing the extract was found to give satisfactory results:—

Eight ounces of belladonna-root, in No. 20 powder, were moistened with 6 fl. oz. of a mixture of 7 fluid parts of 90 per cent. alcohol and 1 fluid part of water, then packed in a cylindrical percolator, 8 fl. oz. more of the same menstruum added, and allowed to macerate for forty-eight hours. Percolation was then allowed to proceed slowly; the first $1\frac{1}{2}$ fl. oz. were collected apart and reserved; more menstruum was added from time to time until a portion, when evaporated and the residue dissolved in $2\frac{1}{2}$ per cent. solution of hydrochloric acid and filtered, ceased to react with Thresh's reagent. The marc was then thoroughly pressed, and the pressings added to the percolate, the alcohol being recovered therefrom by distillation. The residue was then further evaporated in a porcelain dish over a water-bath, and finally dissolved in $1\frac{1}{2}$ fl. oz. reserved, enough menstruum being added to make the product measure 3 fl. oz. This product, assayed by the B.P. process, yielded 1.39 gramme of alkaloid per 100 c.c. To yield a product containing 0.75 gramme per 100 c.c., it then only remained to add to the 3 fl. oz. sufficient menstruum to make the product measure $5\frac{1}{2}$ fl. oz. M 28.

The powdered root used in the above experiments assayed, by a slight modification of the new B.P. process, yielded 0.532 per cent. of alkaloid.

From this it will be seen that the above process extracted 98.229 per cent. of the total alkaloid actually present in the drug taken, as against 77.994 per cent. by the process of the British Pharmacopœia, 1898.

Assay of Belladonna Plasters and the Alkaloidal Strength of Commercial Specimens. C. E. Smith. (*Amer. Journ. Pharm.*, 1898, 182–189.) The author states that the belladonna plasters of the American market are almost without exception prepared with a base containing rubber as the principal ingredient, combined with various resins. Moreover, they are often admittedly prepared from an extract of the rhizome of *Scopolia carniolica*, and in such cases are not “belladonna” plasters, strictly speaking. As, however, the alkaloids of this plant are practically identical with those of *Atropa belladonna*, and are apparently present in more uniform quantity in it than in either the leaf or root of the latter, there might seem to be some excuse for the substitution.

The method of assay adopted was that of S. W. Williams and C. E. Parker, a critical examination of which had satisfied the

author as to its trustworthiness. In outline the process is as follows:—The plaster is cut in strips and the mass disintegrated and partially dissolved by stirring with chloroform made alkaline with ammonia water. The chloroform mixture is decanted and the cloth washed with successive small portions of chloroform. The rubber is precipitated from the chloroform with alcohol, the solution decanted and the rubber re-dissolved with chloroform and re-precipitated with alcohol repeatedly to recover any alkaloid retained in it. The alkaloid is washed out from the united alcohol-chloroform solutions with acid water, the acid solution of alkaloid made alkaline with ammonia and extracted with chloroform. After distillation of the chloroform the alkaloidal residue is titrated with acid.

Eleven commercial samples, comprising the products of six manufacturers, were examined by this process. Ten out of the eleven samples were of American manufacture. The results given in the appended table corroborate previous statements to the effect that a great variation in strength exists. Only three of the samples are considered by the author to be of satisfactory strength. The assay scheme referred to was found suitable for all plasters of American manufacture, but a modification was required for the foreign sample. That portion of it insoluble in the mixture of chloroform and alcohol could not be made to agglutinate, even on the addition of a large quantity of rubber dissolved in chloroform. The most uniform results were obtained by making the chloroform-alcohol solution up to a definite volume and filtering an aliquot part of it. In other respects no change in the method was required.

All porous plasters examined were uniform in square measure, $5 \times 7\frac{1}{2}$ inches, and in the table the average weight of the mass in one plaster is given, except in the cases of plasters put up in rolls.

No.	Per Cent. of Alkaloid in Mass.	Weight of Mass in One Plaster in Grammes.
1	0.586; 0.594; 0.587; 0.571	8.55
2	0.407; 0.403; 0.400; 0.416	8.7
3	0.509; 0.497	—
4	0.112; 0.108	8.65
5	0.103; 0.110	—
6	0.060; 0.058	8.2
7	0.084; 0.081	7.35
8	0.125; 0.116	8.25!
9	0.098; 0.101	8.35
10	0.042; 0.047	5.7
11	0.095; 0.093; 0.096	—

Standardized Pharmaceutical Preparations of Commerce. A. Wathes. (*Chemist and Druggist*, li. 821.) The author has examined commercial specimens of a number of B.P. preparations required to be of a definite standard of strength. His results, as embodied in the following table, seem to show that standardization is in many cases neglected, or carried out in an unsatisfactory manner.

Drug Examined.	Number of Samples Examined.	Highest per cent.	Lowest per cent.	Substance Estimated.
Acidum hydrocyanicum dilutum . .	5	2.29	1.68	Hydrocyanic acid
Extractum cinchonæ liquidum .	4	4.20	3.10	Alkaloids
Injectio morphinæ hypodermica . .	5	4.03 gr.	3.58 gr.	Morphine in 1 fl. dr.
Liquor arsenicalis . .	5	.970	.847	Arsenious acid
Liquor arsenici hydrochloricus . .	4	.980	.863	Arsenious acid
Liq. calcis chlorinatæ	3	2.5	.46	Available chlorine
Liquor calcis saccharatus	5	2.15	1.23	Calcium oxide
Liquor ferri dialysatus	5	4.94	3.31	Ferric oxide
Liquor ferri perchloridi fortior .	5	15.8 gr.	14.40 gr.	Ferric oxide in 1 fl. dr.
Liquor potassæ . .	5	6.56	5.60	Potassium hydrate
Liquor sodæ . .	4	5.36	4.16	Sodium hydrate
Liquor sodæ chlorinatæ	5	4.19	.02	Available chlorine
Syrupus ferri iodidi	5	3.5 gr.	3.1 gr.	Iodide of iron in 1 fl. dr.

Alkaloidal-Assay of Tinctures and Extracts. J. Katz. (*Pharm. Zeitung*, xliii. 273.) The author suggests the following process, in which the action of heat is entirely avoided:—

25 c.c. of a tincture containing 45 per cent. of alcohol are agitated in a separator with 50 c.c. of ether and 1 c.c. of caustic soda solution (33 per cent.). The aqueous solution is separated and shaken twice again with 25 c.c. of ether containing 10 per cent. of alcohol. The ether solution is now agitated with 2 to 3 grammes of plaster of Paris to remove water, and filtered into a stoppered flask. The alkaloid in the ethereal solution is titrated with centinormal hydrochloric acid, using three drops of an alcoholic solution of iodeosin as an indicator. Alkaloids, such as strychnine, which

require chloroform as a solvent, are extracted from tinctures with a mixture containing one part of chloroform and three parts of ether. The chloroform-ether solution is washed with brine, and the separation of the solvent from the aqueous layer is also accelerated by the addition of 2 to 3 grammes of sodium chloride. Tinctures containing more than 45 per cent. of alcohol are diluted with water to this strength, and those containing chlorophyll are first acidulated and the chlorophyll filtered off before determining the alkaloids as above described. Extracts are dissolved in 45 per cent. alcohol, and the solution treated as before.

Reaction of Cherry Laurel Water with Cocaine Hydrochloride. L. Daclain. (*Monit. de la Pharm.*, 1897, 2554.) When a solution of cocaine hydrochloride is added to genuine cherry laurel water, a precipitate is formed which is soluble in weak solutions of alkalies or in lime water. The presence of either of these solvents, or even of minute quantities of magnesia, would therefore prevent the formation of this precipitate. Hence artificial cherry laurel water, in the preparation of which lime or magnesia has been used, can thus be distinguished from the genuine article.

Pharmaceutical Preparations of Birch Leaves (*Betula Alba*). M. Moreau. (*Rep. de Pharm.*, 1898.) The author gives directions for the preparation of a decoction and an extract possessing the diuretic properties of the leaves (see *Year-Book of Pharmacy*, 1897, 144). In order to ensure the complete extraction of the active resin (Kossmann's betularetic acid), he suggests the use of sodium bicarbonate in the preparation of the decoction. For 50 grammes of leaves 1 gramme of this salt is sufficient, and this is added as soon as the temperature of the liquid has reached about 40° C. A good extract may be obtained by exhausting the leaves in a percolator with alcohol, then distilling off the latter from the percolate and evaporating the residue. 1.5 to 2.5 grammes of the extract may be given daily, and are best administered in the form of pills. The leaves should be collected during the flowering period.

Note on Vinum Condurango. (*Pharm. Zeitung*, from *Zeitschr. des oesterr. Apoth. Ver.*, xxxvi. 6.) The clarification of this preparation is best affected by shaking with milk or solution of gelatin. Magnesium carbonate or calcined magnesia ought not to be used for this purpose.

Syrupus Althææ. L. Meissen. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxvi. 304.) The author recommends this syrup to be prepared as follows:—2 parts of marshmallow root are washed with cold water, then mixed with 1 part of rectified spirit and 2

parts of water, and allowed to macerate in a percolator for three hours. Percolation is then started and allowed to proceed till 10 parts of percolate have been collected; this is heated to the boiling point and filtered. The percolate keeps fairly well in a cool place. In order to prepare the syrup from it, 1 part is mixed with 9 parts of simple syrup and 3 parts of water.

Syrupus Rhei. L. Meissen. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxvi. 305.) According to the author, a very good preparation is obtained by the following process:—10 parts of rhubarb root, 1 part of potassium carbonate and 1 part of borax are allowed to macerate in 10 parts of distilled water for 12 hours at 15° to 20° C., the mixture being stirred occasionally. The liquid is then strained, the marc pressed, the latter treated with more water and again pressed until 18 parts of strained liquid have been obtained. The latter is now heated to the boiling point, then allowed to cool, filtered, and mixed with 2 parts of rectified spirit and 1 drop of oil of cinnamon. The liquor thus obtained can be kept for some time in a cool place. The syrup is made from it by mixing 1 part with 9 parts of simple syrup.

Tinctura Rhei Vinosa. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxvi. 103.) It is suggested in this paper to prepare this tincture from a fluid extract of rhubarb obtained from the root by percolation with dilute alcohol (1:2). This method would exclude from the tincture the substances which so often cause it to become thick and turbid. A very satisfactory tincture may be prepared by mixing 40 grammes of such a fluid extract with 30 grammes of powdered sugar, and subsequently with a tincture made by digesting 5 grammes of orange peel and 2 grammes of cardamoms with 170 grammes of Malaga wine. The mixture is allowed to stand for a few days and is then filtered.

Unguentum Acidi Carbolici, B.P. C. F. Henry. (*Chemist and Druggist*, lii. 109, 110.) The author shows the statement that carbolic acid is soluble in soft paraffin to the extent of 1 in 20 to be incorrect, as on cooling of a hot solution of that strength a portion of the carbolic acid always crystallises out. A similar crystallisation takes place in the official carbolic acid ointment, which contains 1 part of the acid to 19 parts of a mixture of hard and soft paraffins. The actual solubility is about 1 in 32. The author also considers it a mistake to make an ointment of a volatile substance like carbolic acid by means of heat. The results of a number of experiments, carried out by him with a view of effecting

improvements, have led to the recommendation of the following process :—

R Carbolic Acid	. 25 grains or 1 gramme or part.
Glycerin	. 50 minims or 2 grammes or parts.
Water	. 50 minims or 2 grammes or parts.
Wool-fat	. 350 grains or 14 grammes or parts.

Dissolve the acid in the glycerin, add the water, then mix with the wool-fat. The water is added to hydrate the glycerin.

Mercuric Oxide Ointment. M. Schweissinger. (*Zeitschr. des oesterr. Apoth. Ver.*, lii. 6, 7.) For ophthalmic purposes it is of great importance that the mercuric oxide in this ointment should be most finely divided. As the ordinary mode of preparing such an ointment does not yield a sufficiently satisfactory product in this respect, the author suggests the following *modus operandi* :—A quantity of mercuric chloride, exactly equivalent to that of the mercuric oxide required, is dissolved in water, the oxide precipitated from it by the requisite amount of sodium hydrate, the precipitate thoroughly washed on a filter and well drained by means of a suction pump. When the moisture has been removed as far as possible in this manner, the oxide is intimately mixed with a fatty basis, the weight of the remaining moisture being deducted from that of the latter, in order to obtain an ointment of the exact strength.

It is suggested that some other ointments, such as white precipitate ointment, or zinc ointment, might be made for special purposes in an analogous manner.

Suppositories. E. White and J. O. Braithwaite. (*Pharm. Journ.*, 4th series, v. 437–441.) In an elaborate paper on this subject, the authors deal with the following points :—

1. Suppository moulds.
2. Examination of suppositories derived from various sources ; methods of analysis.
3. Observations on oil of theobroma.
4. Methods of manufacture.
5. Suggestions for improvement.

As the details, which are of much practical interest, cannot be adequately dealt with in an abstract, we confine ourselves here to this brief notice, and refer the reader to the original paper. See also a further paper by one of the authors (E. White) on "Oil of Theobroma" (*Pharm. Journ.*, 4th series, vi. 69), an abstract of which will be found in this volume,

Basis for Gelatin Suppositories. L. A. Mieux. (*Pharm. Journ.*, 4th series, vi. 23.) In a paper read before the Wisconsin Pharmaceutical Association, the author recommends the following formula for a gelatin basis for suppositories:—Gelatin, 40 parts; glycerin, 25 parts; water to make 100 parts, or, if a softer mass is required, 120 to 130 parts. The product is said to be well adapted for use with alun and other salts. The addition of 25 parts of powdered acacia or dextrin in place of an equivalent amount of water renders the mass more suitable for use in summer or in a warm or moist atmosphere. In either case the gelatin should be soaked in 200 parts of water until soft, the glycerin (and gum, if required) added, and the whole heated on a water-bath until complete solution is effected and the excess of water evaporated. Stir gently whilst heating, and keep the temperature well below boiling point. If air holes appear in the mass on cooling, it must be re-heated with 100 parts of water, and the whole again evaporated to the required bulk. The moulds should be oiled before filling, and, if made of metal, should previously be heated to about 50° C.

Salol Pill Coating. (From *Pharm. Era*.) The perfectly dry pills, free from powder, are rotated in a dish in which a small quantity of salol has been melted. They are then rotated in another dish which has been heated just sufficiently to soften or re-melt the outer surface of the salol. This second process completely removes all roughness from the coating and gives an attractive glossy appearance to the pills.

NOTES AND FORMULÆ.

PART III.

NOTES AND FORMULÆ.

Bryonin in the Treatment of Hepatic Congestion. (*Amer. Journ. Pharm.*, from *Gaz. hebdomadaire de médecine et de chirurgie*, February 3rd, 1898.)

R. Bryonin	1½ grains.
Sugar of Milk	60 "
Gum Arabic	15 "
Syrup	q.s.

M.—Divide into a hundred granules. One to be taken every two hours, until the bowels are sufficiently moved.

Migranine in Neuralgia. (*Wiener Klin. Rundsch.*, xi. 257. From *Pharm. Journ.*) Möller reports on several cases of trigeminous neuralgia where one to two doses of 1 gramme of migranine produced excellent results. The patients were all chronic sufferers from neuralgia, who had vainly tried other remedies. As a rule, two doses of migranine sufficed to remove the pain, and after some perseverance with the remedy, long intervals (up to six months) were enjoyed free from attacks of neuralgia.

Euphthalmine, a New Mydriatic. (*Zeitschr. des oesterr. Apoth. Ver.*, 1897, 625.) This name is given to phenylglycolyl-N-methyl-β-vinyldiacetonalkamine, which is found to be a powerful mydriatic, without affecting the accommodation or producing any other unpleasant symptoms. The instillation into the eye of two or three drops of a 2 per cent. solution develops mydriasis after 20 to 30 minutes, and this completely disappears again after 2 or 3 hours. Vossius recommends this substance as excellently suited for the purpose of ophthalmoscopic examinations.

C. D. Harries (*Ber. der deutsch. chem. Ges.*, xxxi. 665) describes *euphthalmine hydrochloride*, $C_{17}H_{25}O_3N$, HCl , and *euphthalmine salicylate*, $C_{17}H_{25}O_3N$, $C_6H_4(OH) \cdot COOH$. The former is a stable, snow-white, crystalline product, which, after recrystallisation, loses the deliquescent character possessed by the crude

material precipitated by hydrochloric acid from an ethereal solution of the base. It melts at 183–184°, and is very readily soluble in water. The salicylate melts at 115–116°.

Tribenzoylgallic Acid, a New Astringent. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 859.) This preparation is obtained by shaking an alkaline solution of gallic acid with benzoyl chloride, then boiling the product with water and purifying by crystallisation. It melts at 180° C., is colourless, odourless, and tasteless, undergoes no change on keeping, and suffers no decomposition in the stomach. In the bowels, however, it is readily and completely broken up, and the gallic acid thus liberated from it then produces its full astringent effects.

Validol. G. Schwersenski. (*Therap. Monatshefte*, 1897, 604.) This name is given to a new preparation consisting of a chemical compound of menthol and valerianic acid along with 30 per cent. of free (uncombined) menthol. It is a clear colourless liquid of the consistence of glycerin, and has a mild, refreshing, slightly bitter but pleasant taste. It does not produce the slightest irritation, and is well borne by the most sensitive stomach. The proportion of free menthol in the preparation can be increased if desired, as this is readily soluble in it. It is employed as a powerful reviving stimulant in the place of musk, ether, alcohol, etc., and is stated to be also a good stomachic, carminative, and nerve tonic. It promotes appetite, removes nausea and discomfort in the digestive organs, and has also proved very serviceable in hysterical and neurasthenic conditions. It is given in doses of 10 to 15 drops once or several times a day with a teaspoonful of wine or on a piece of lump sugar; and it is also used as an inhalation, and sometimes externally. In cases of sore throat it is applied locally by means of a brush. On the skin it acts as an antiseptic and disinfectant.

Anesin (Aneson). (*Apoth. Zeit.*, xii. 608.) The compound introduced under the name of anesin (subsequently changed to aneson) as a new hypnotic and anæsthetic, is described as an aqueous solution of tertiary trichlorobutyl alcohol and as being equal in its anæsthetic action to a 2 per cent. solution of cocaine. As a hypnotic, it is given internally in doses of 0·5–1 gramme, and is stated to be analogous to chloral hydrate in its action.

Anesin should not be confounded with anæsin (see *Year-Book of Pharmacy*, 1897, 251).

Orthoform, a New Local Anæsthetic. A. Einhorn and R. Heinz. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 568, from *Münch. med. Wochenschr.*, xlv. 931.) Under this name, the

authors describe a new synthetical product, which is the methyl ester of *p*-amido-*m*-oxybenzoic acid, and is stated to possess powerful anæsthetic and antiseptic properties. The latter, together with its non-toxic character, render it particularly useful for the treatment of wounds. It has a remarkable effect upon burns, contusions, and painful abscesses, and has been found very beneficial in the treatment of ulcerations of the throat or stomach and also in cancer. It can be very freely applied as a dusting powder to wounded surfaces without any risk, and has been internally administered to the extent of from 8-15 grains daily.

Orthoform is a white, light, crystalline powder, free from taste and smell, and is only slightly and slowly soluble in water. It melts at 120° C. Its slow and sparing solubility, and its consequent slow absorption, give it an advantage over other anæsthetic agents, in producing a more gradual and durable effect. The hydrochloride is crystallisable and readily soluble in water, and possesses the same anæsthetic properties as the free ester; but as its solution has an acid reaction, it is less generally applicable, and is particularly unsuited for ophthalmic use or for application to sensitive mucous membranes. Hence it is not well adapted for hypodermic use.

For anæsthetic purposes, orthoform is best applied in a very finely powdered state, so as to ensure uniformity in its action.

New Synthetic Remedies. (*Pharm. Journ.*, 4th series, v. 189.) By condensation of *p*-phenetidin with protocatechuic aldehyde, C. Goldschmidt has obtained a product soluble in water crystallising with two molecules of water and melting at 220°. It is described as possessing hypnotic, antineuralgic and antipyretic properties. With the dimethyl derivative of protocatechuic aldehyde *p*-phenetidin yields a product melting at 210° C., and crystallisable from hot water with two molecules of water. With opianic acid *p*-phenetidin yields a product melting at 175° C., insoluble in water. Both products possess antipyretic properties, and are powerful hypnotics.

By the reaction of bromacetophenone and sodium oxyquinoline Zimmer and Co. have obtained a powerful basic product forming crystallisable salts, and possessing marked hypnotic properties. The base is readily soluble in alcohol, chloroform, or acetone; it crystallises in needles, and melts at 130° C., and it differs from acetophenone in being both odourless and tasteless.

Anilipyrine (Phenyldimethylpyrazolone-Acetanilid). H. Gilbert and P. Yvon. (*Nouv. Rem.*, 1898, 121.) Anilipyrine is a com-

pound of antipyrine and acetanilid, and, like its constituents, is used as an antipyretic and analgetic. The authors distinguish between an α - and β -anilipyrine, the former of which contains 1 and the latter 2 molecules of antipyrine.

α -Anilipyrine (mono-phenyldimethylpyrazolone-acetanilid) is obtained by carefully melting together equal molecular weights of the two components in a steam bath and allowing to cool. On heating, the product begins to soften at 55° , but its real melting point is 75° C. It is soluble in water, alcohol, ether, chloroform, and glycerin. When an aqueous solution of this substance is evaporated, dissociation takes place.

β -Anilipyrine (di-phenyldimethylpyrazolone-acetanilid) does not suffer dissociation in aqueous solution as the preceding compound, and can therefore be prepared by dissolving 2 molecular weights of antipyrine in a small quantity of warm water or alcohol, adding 1 molecular weight of acetanilid and evaporating to the point of crystallisation. It can also be obtained in a crystalline state by fusing the two components together in the proportion stated. The product softens between 75° and 80° C., and melts at 105° ; its melting point is therefore still below that of its components. It is readily soluble in water, alcohol, ether, chloroform, and glycerin, but less freely so in ether than in any of the other solvents named.

The foregoing preparations are stated to be specially suitable in influenza, acute rheumatism, neuralgia, and migraine, and are given in doses of 0.5 gramme 2 to 4 times daily.

Valerydin. (From *Pharm. Centralhalle*.) The preparation introduced under this name is the valerianic ester of *p*-amidophenetol, and is stated to combine the therapeutic effects of valerianic acid with those of phenacetin. It is odourless and tasteless, and crystallises in white lustrous needles, which melt at 129° C., and are readily soluble in alcohol, chloroform, and acetone, more difficultly soluble in ether and petroleum ether, and almost insoluble in water. It is given in doses of 0.5 to 1 gramme several times daily.

Tannipyrine. (From *Pharm. Centralhalle*.) This name is given to a compound of antipyrine and tannin, and is stated to combine the antipyretic effects of the former with the astringent action of the latter.

A New Antipyretic. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxvi. 806.) A new antipyretic recently introduced by von Rad is a condensation product of *p*-phenetidin and furfurol, and is stated to possess valuable antithermic and anodyne properties, and to be non-poisonous. The product is insoluble in water, but soluble in

ether, alcohol, and benzol. It crystallises from ether in large pale yellow plates, melting at 72° to 73° C. It is not decomposed on boiling with water or dilute alkalies, but is split up into its components by dilute acids.

Agathin. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxvi. 79.) The preparation introduced under this name as an antineuralgic and antirheumatic remedy is salicyl- α -methylphenylhydrazone. It is a white, crystalline, odourless and tasteless powder, soluble in alcohol, ether, and benzene, but insoluble in water. The dose is 0.1–0.5 gramme two or three times a day.

Phesin. Z. von Vámosy and B. Fényvessy. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 549, and *Théráp. Monatsh.*, xi. 428.) This new antipyretic is a compound analogous to cosaprin, being a sulpho-derivative of phenacetin while cosaprin is the corresponding derivative of antifebrin. It is a pale brownish-red, light, amorphous powder, having a caustic saline taste but no odour. It is readily soluble in water, yielding a dark-brown slightly acid solution. It is stated to have the advantage over phenacetin of being more soluble, prompter in its action and comparatively harmless. It also admits of hypodermic application.

Sodium Acetosulphanilate. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 753.) This new antipyretic is formed along with small quantities of sodium acetate and free sulphanilic acid in the acetylation of sodium sulphanilate by means of glacial acetic acid. The free acid is removed from the crude product by treatment with a small quantity of water in which it is insoluble, and the pure preparation is then obtained from the aqueous solution by precipitation with absolute alcohol.

The pure salt is readily soluble in water, difficultly soluble in alcohol, and insoluble in ether, and forms a white micro-crystalline hygroscopic mass. As an antipyretic it is stated to be superior to antifebrin and prompter in its action, owing to its ready solubility in water.

Migrol. (*Pharm. Zeitung*, xlii. 483.) This name is applied to a mixture of equal parts of sodium-pyrocatechol acetate and caffeine-pyrocatechol acetate. It is administered in doses of 0.5 gramme three times daily for migraine, headache, and neurasthenic conditions.

Oxycamphor. (*L'Union Pharm.*, xxxviii. 296. From *Pharm. Journ.*) See also *Year-Book of Pharmacy*, 1897, 229. By treating a mixture of camphor and orthoquinone with zinc dust, or aluminium amalgam, oxycamphor is obtained, in which an atom of

hydrogen in the camphor molecule has been replaced by an hydroxyl radicle. It is a crystalline body soluble to about 1 in 50 in cold water. From experiments on animals it would seem that oxycamphor may be given in large doses without danger, and that it exercises a markedly sedative action on the respiratory centre. As an antidyspnoeic, it is as active as morphine, although without any narcotic action; dyspnoea in cardiac cases has been relieved by single daily doses of 1 gramme, or the same dose night and morning; as much as 3 grammes may be given in the course of twenty-four hours in doses of 0.50 centigramme to 1 gramme.

Phenylpilocarpine. (*Pharm. Centralh.*, 1897, 679.) This preparation, reported upon by Edson, is a mere solution of pilocarpine and carbolic acid, and is a colourless oily liquid readily soluble in water and alcohol; the liquid becomes dark coloured on keeping. A solution of 0.02 gramme of this preparation in 100 c.c. of carbolic water (containing 2.75 per cent. of carbolic acid) is used under the name *aseptolin* for hypodermic injections in the treatment of phthisis.

Guaiaquin. (*Chemist and Druggist*, li. 429.) Guaiaquin (quinine guaiacol-bisulphonate) is prepared by the interaction of guaiacol-sulphonate and quinine in molecular proportions. Its formula is—



and it occurs as a yellowish, acid, bitter solid which is readily soluble in water, alcohol, or dilute acids. It is introduced as a substitute for guaiacol.

Quinopyrine (Chinopyrine). C. G. Santesson. (*Pharm. Zeitung*, 1897, 623.) The substance introduced under this name is a highly concentrated solution of quinine hydrochloride and anti-pyrine. Lavereau has shown that the pain which is often observed after hypodermic injections of quinine is never experienced with this combination, and the author confirms this observation. There seems to be a marked difference, moreover, between the action of this preparation and that of its components, and the author is therefore inclined to regard quinopyrine, not as a mere mixture of the two constituents, but as a chemical combination.

Quinoral (Chinoral). (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 753.) C. Meyer has given this name to a neutral compound of quinine and chloral, which is described as a thick, oily liquid, soluble in water and alcohol, and having a very bitter taste. It is

stated to be free from the irritating action of chloral and from the depressing effect of the latter on the heart. It is, however, chiefly recommended as a powerful antiseptic, surpassing mercuric chloride and carbolic acid in its bactericidal action, and having the advantage of comparative non-toxicity. Internally it is given as an hypnotic in doses of 0·5–1·0 gramme.

Blennostasin. (*Pharm. Centralh.*, 1887, 722.) This name is given to a derivative of a cinchona alkaloid crystallising from dilute solutions in large prisms, and from concentrated solutions in the form of needles. It is soluble in water and has a strongly bitter taste. It has a powerful influence on the vaso-motor system of the respiratory nerve centres, and though not toxic, it somewhat resembles belladonna in its effects. It acts as a sedative on the brain, and diminishes reflex action. It is given in capsules or in the form of pills, preferably in the latter. Chappel has employed it with success in hay fever and influenza.

Tenaline. (*Brit. Med. Journ.*, 1898, 35.) This name is applied to a substance obtained from areca nut, and is stated to contain the anthelmintic alkaloids arecaine, arecaidine, and guvacine, while being nearly free from the very toxic principle arecoline. F. Hobday has investigated its action, and has found it to be a very efficient vermifuge, applicable alike for tapeworm or ascarides. The dose is 1 minim per pound of body weight, and is administered without any purgative; it may be doubled, if necessary, with perfect safety. It may be administered either pure or with the addition of a little water, the latter mode being preferable. In cases of tapeworm, it seems invariably to cause expulsion of the head as well as of the segments, thus getting rid of the most troublesome part of the parasite. Tenaline is unsuitable for subcutaneous use.

Iodogallicin. (*Pharm. Centralh.*, 1897, 604.) This preparation, which is closely allied to airol, both chemically and as an antiseptic, is obtained by the action of bismuth oxyiodide on the methyl ester of gallic acid, and may therefore be termed bismuth oxyiodomethylgallol. In its antiseptic properties it is stated to be much superior to iodoform. It is a dark grey, amorphous, light powder, which is insoluble in the ordinary solvents, and is decomposed by acids and alkalies, and also by water during prolonged action. It contains 23·6 per cent. of iodine and 38·4 per cent. of bismuth.

Bismuth Oxyiodopyrogallate. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 799.) This is a preparation analogous to the oxyiodo-

gallate of bismuth, and forms an amorphous yellowish red powder, which is not affected by exposure to air or light, and is insoluble in water and most of the ordinary solvents. It is employed as an antiseptic.

Pyraloxin. W. Mielck. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 549, from *Pharm. Zeitung*.) This name is applied to an oxidation product of pyrogallol, which the author has prepared at the suggestion of Unna, the latter having observed that the effects produced by pyrogallol in dermatological practice are due, not to this substance itself, but to products of oxidation. Pyraloxin is therefore offered as a preparation combining the therapeutic effects of pyrogallol with the advantage of absolute freedom from irritating action.

Pyraloxin is a black powder sparingly soluble in water, and insoluble in absolute alcohol and ether. Its chemical constitution is still under investigation.

Pyroform. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxvi. 57.) This preparation is obtained by treating bismuth oxyiodide with pyraloxin, an oxidation product of pyrogallol (preceding abstract). The product is less toxic than pyrogallol, and its use is suggested in place of the latter in dermatology.

Colchicine Salicylate (Colchisal). (From *Pharm. Centralhalle*.) Colchicine salicylate is an amorphous yellow powder, soluble in water, alcohol, and ether, and is given in the treatment of rheumatism and gout in doses of 0.00075 gramme. The commercial appellation *colchisal* has been suggested for this preparation.

Aluminium Salicylate. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxvi. 80.) This salt is obtained as a white or pinkish-white powder by precipitation from the solution of an aluminium salt by means of sodium salicylate. It is used as a dusting powder in catarrhal affections of the nose and larynx, and is offered commercially under the name "saluminium." It is insoluble in water.

Salicylate of aluminium and ammonium is obtained by treating the preceding salt with ammonia. It is used for the same purposes as aluminium salicylate, from which it differs by its solubility in water; hence its commercial name *saluminium soluble*.

Chrysoidin. (*Pharm. Journ.*, 4th series, v. 4, from *Merck's Berichte*.) The azo-dye known as chrysoidin, or diamidoazobenzene hydrochloride, $C_6H_5-N=N-C_6H_3(NH_2)_2 \cdot HCl$, has recently become of interest in medicine on account of its reputed action on Koch's cholera bacillus (see *Year-Book of Pharmacy*, 1897, 201). It is a reddish-brown crystalline powder, soluble in water. According to Blachstein it has the same effect upon the comma bacilli of

cholera as the bactericide cholera serum, causing a precipitation of the bacilli in the agglutinated condition, but without affecting any of the other kinds of bacilli. Blachstein considers that chrysoidin may be usefully applied for the disinfection of sewage, and medicinally as an application for washing the mouth, etc. For disinfection of the intestinal canal it cannot be used, as it is absorbed in the stomach and excreted by the kidneys. Some doubt has been thrown upon Blachstein's observations by Sobernheim, who was unable to obtain similar results.

Gonotoxin and Gonococcus Serum. M. de Christmas. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 692, from *Pharm. Zeitung*.) Gonotoxin is a toxic principle which develops in cultures of Neisser's gonococcus. By evaporating the cultures and extracting the residue with glycerin, the author obtained a solution producing a strong toxic action on rabbits. This was employed for immunising goats, and the serum subsequently obtained from the latter was found to possess the power of counteracting the effects of gonotoxin in rabbits and other small animals. The author hopes to succeed in obtaining such serum in a more concentrated form, in which he expects it to be capable of preventing or curing gonorrhœic infection in man.

Protargol. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 625.) This preparation, introduced by A. Eichengrün, is an intimate compound of silver and proteïds, in which the silver is so firmly combined that even acids fail to break up the combination. Hence it is entirely free from irritating action. It is stated to be very valuable in gonorrhœa and as an antiseptic for wounds. It is a fine yellow powder which, after being moistened, is soluble in cold or lukewarm water to the extent of 50 per cent. From this solution acids throw down a small quantity of unaltered protargol, which re-dissolves on the addition of more water. Protargol contains more silver (8·3 per cent.) than other organic silver compounds of a similar nature, and is stated to be superior to the latter in its bactericidal action.

Protargol Ointment. A. Darier. (*Chemist and Druggist*, lii. 880.) The author suggests the following formula for an ointment intended for cases of blepharitis and blepharo-conjunctivitis:—

Protargol	. . . . .	1½ grammes
Oxide of Zinc	. . . . .	1 gramme
Starch	. . . . .	1 "
Vaseline	. . . . .	15 grammes

(Ointment for the eyelids.

Itrol and Actol. (*Nouv. Rem.*, xiii. 562. From *Pharm. Journ.*; also *Pharm. Centralh.*, xxxviii. 460.) Itrol, or silver citrate, and actol (silver lactate) are both now recognised as valuable antiseptics. For convenience they may be prepared in tablets, similar to sublimate tablets, containing 10 centigrammes of itrol or 20 centigrammes of actol. These salts are as powerful germicides as sublimate and are practically non-toxic. In addition to these a gauze strongly impregnated with metallic silver is now recommended for dressing wounds. Bougies of itrol containing 2 per cent. of that substance with cacao butter are employed as disinfectants of the urethra and bladder. Silver silk, catgut, and drains are also recommended, and are thus prepared. The material is plunged in a wide mouth brown glass bottle, containing a 1 per cent. solution of actol. Silk should be immersed thus for fourteen days; catgut and drains for eight days. They are then withdrawn and washed with water until this remains clear, then exposed to sunlight until they assume a brownish-black colour. They are kept wrapped in several folds of gauze, and are dipped in boiling water for a few minutes immediately before use, or they may be kept in alcohol. Silver wool is found very effective in dentistry as a packing to remove the fetid odour of decayed teeth. Silver adhesive plaster is particularly serviceable for strapping up small cuts, etc. The silver dressing is composed of gauze of large meshes covered with silver leaf. The only drawback to the use of these silver antiseptics is that they may give rise to stains on the linen. These may readily be removed by soaking the spots for a few minutes in a solution of mercuric chloride, 10; salt, 25; water, 2,000; and then rubbing well in pure water.

Werler reports very favourably on the action of itrol when applied as a urethral injection. Four injections are applied daily, beginning with a solution of 1:8,000, and gradually increasing the strength to 1:4,000. He also testifies to the comparative freedom of this remedy from local irritating action.

Largin. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxvi. 256.) This new silver compound is prepared by treating paranucleoproteïds with alkalies, then precipitating with an acid to remove the phosphorus compounds, and treating the dry residue left by the filtrate with solution of sodium hydrate and ammoniacal silver nitrate. It is a pale grey powder, soluble in water, glycerin, blood-serum, and in solutions of albumins or peptones, but insoluble in alcohol, ether, carbon bisulphide, and benzol. It contains 11.1 per cent. of silver.

Its aqueous solution has a slight alkaline reaction and is not precipitated by either chlorides or albumin.

Like certain other silver-albumin compounds recently introduced, this preparation is powerfully destructive to gonococci, and is therefore recommended in the treatment of gonorrhœa. It is credited with various advantages over the other similar preparations referred to.

Ursal. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 859.) Ursal is a combination of urea with salicylic acid which is intended to combine the diuretic effect of the former with the specific action of the latter, and is therefore recommended in gouty and rheumatic affections. The dose is the same as that of sodium salicylate.

Linadin. (*L'Union Pharm.*, xxxvii. 207.) This preparation is obtained from the spleen, and contains 0.01 to 0.02 per cent. of iodine in combination. It is a brown odourless powder, having a somewhat fishy taste. It is contained in the spleen to the extent of about 10 per cent. Upon incineration it leaves an ash containing appreciable quantities of iron.

Thyrogen. F. Blum. (*Pharm. Zeitung*, from *Münch. med. Wochenschr.*, 1898, No. 8.) Prolonged exhaustion with water extracts the greater part of the iodine compound from thyroid glands. Upon heating this aqueous solution with or without the addition of salt, a coagulum is formed which contains the whole of the iodine, not however in the form of iodothyrim, but still in combination with albumin. The iodine compound of albumin obtained in this manner is called by the author *thyrogen c.* It shares with the albumins the property of being coagulated by heat, and of forming with formaldehyde a non-coagulable compound. The latter is referred to by the author as *thyrogen f.*

Peptomedullin, Peptothyroidin and Peptovarin. G. Maurange. (*Journ. de Pharm. et de Chim.*, 1897 [6], vi. 11.) The author has attempted to obtain active products from the thyroid gland, the ovary, and bone marrow, by a process of peptonization, and describes the peptones thus obtained under the respective names of peptothyroidin, peptovarin, and peptomedullin. All these are stated to keep well in the dry state, and also in the form of a thick liquid containing an addition of a mixture of equal volumes of glycerin and alcohol. They are usually taken in wine. The author gives the following directions for the preparation of a peptothyroidin wine. 100 grammes of the glands are finely chopped, and digested with a solution of 2 grammes of pepsin and 15 grammes of tartaric acid in 500 c.c. of water for 6 to 8 hours at a temperature not

exceeding 45° C. After complete peptonization (recognised by the non-formation of a precipitate on adding to a small filtered portion a few drops of nitric acid), the filtrate is neutralized with sodium bicarbonate, again filtered, and evaporated in vacuo to the consistence of a syrup at a temperature not exceeding 45° C. The residual syrup is mixed with 7½ litres of wine containing about 10 per cent. of alcohol, then allowed to stand for 2 days, and again filtered.

The author's experiments indicate that the physiological effects of these peptones are identical with those of the fresh organs, and that they are more satisfactory in this respect than the commercial extracts of the latter.

Tannone. (*Zeitschr. des oesterr. Apoth. Ver.*, 1897, 859, and 1898, 126 and 145.) This name is given to a condensation product of tannin and urotropin, which, according to Schreiber (*Deutsch. med. Wochenschr.*, 1897, 48), is useful in various forms of peritonitis and catarrh of the bowels. It is stated to consist of 87 per cent. of tannin and 13 per cent. of urotropin. It is a pale brown, light, tasteless, and slightly hygroscopic powder, almost insoluble in water, dilute acids, alcohol, or ether, but slowly soluble in alkalis. It splits up in the organism into its constituents, and hence the urine eliminated after its administration gives an orange yellow precipitate with saturated bromine water, which reaction is characteristic for urotropin. The dose for adults is 1 gramme three or four times a day; for children 0.2 to 0.5 gramme.

Tannone is prepared by dissolving 1,400 grammes of hexamethylenetetramine in 20 litres of water, and slowly adding to this with constant stirring a cold solution of 3,200 grammes of tannin in 20 litres of water. The precipitate thus formed is collected, pressed, broken up into small particles, and slowly heated to 100° C. When thus heated it first liquefies, then changes to a thick paste, and ultimately to a hard solid mass. The same result is obtained by boiling the product for some time with glycerin or water.

Tannopin is another name for the same substance, which it is now proposed to substitute for the name tannone.

Bismuthan. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxvi. 125.) A combination of bismuth, resorcin, and tannin is introduced under this name by Bion as an antidiarrhoeic, especially intended for children. It forms a yellow odourless powder insoluble in water, and has a slightly sweet taste. It is stated to be very serviceable in indigestion associated with diarrhoea or vomiting. A teaspoonful of a mixture containing 2 grammes in 100 grammes of *mixtura gummosa* may be given every 2 hours to children under

2 years. The dose for adults is 0·5 to 1 gramme of bismuthan several times a day. No unpleasant effects have been observed.

Lupetazine. (From *Zeitschr. des oesterr. Apoth. Ver.*) This name is given to dimethylpiperazine, the therapeutic properties of which are stated to be analogous to those of piperazine.

Bromalin. (*L'Union Pharm.*, xxxviii.) This name is given to bromethylformin, which is recommended in doses of 2 to 4 grammes two or three times a day as a sedative in epilepsy and similar disturbances of the nervous system.

Aethacol. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxvi. 79.) This name is given by Kalle to the monoethyl ether of pyrocatechin.

Thiocol. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxvi. 306.) This name is given to the potassium salt of guaiacolsulphonic acid, which is a white powder having both a bitter and a sweetish taste, and containing 60 per cent. of guaiacol. It is freely soluble in water and readily assimilable, and does not irritate the mucous membranes. It is stated to be of service in the treatment of pulmonary tuberculosis, and is given in daily doses of 10 to 15 grammes, dissolved in water and flavoured with syrup of orange.

Sirolin. (From *Therap. Monatsh.*) Sirolin is a palatable preparation containing the active constituents of beech-wood tar, chiefly guaiacol. It is readily borne even by children, and it is given in affections of the respiratory organs (phthisis, bronchitis, catarrh of the larynx, asthma, whooping-cough, etc.). The dose is one teaspoonful once, twice, or three times a day, according to the patient's age.

Phosphote. J. Brissouet. (From *Pharm. Zeitung.*) This preparation is a creosote compound prepared by the action of one molecule of phosphorus oxychloride on three molecules of creosote in presence of an alkali. The oily product is well washed with water and dilute soda solution and then dried.

Guaiaacyl. (*Journ. de Pharm. et de Chim.*, 1898, 324.) Guaiaacyl is a sulpho-addition product of guaiacol, which André recommends as an anæsthetic. It is employed in the form of a 5 or 10 per cent. solution, of which 0·5 to 1·5 gramme is used as an injection. It is a bluish-grey powder soluble in water and alcohol, but insoluble in fats or fatty oils. The 5 per cent. aqueous solution has a violet colour, and is not liable to change on keeping.

Guaiaacyl is prepared as follows:—100 grammes of pure guaiacol are melted at a gentle heat and then mixed very slowly and gradually with 100 grammes of concentrated sulphuric acid, the mixture being cooled during this operation. The product is allowed to stand

at an ordinary temperature for 48 hours, then mixed with six or seven times its quantity of distilled water, heated on a water-bath to 80°C ., and slowly neutralised with calcium carbonate. The mixture is then filtered and evaporated to dryness, the residue taken up with four to five times its weight of 90 per cent. alcohol, and the resulting solution again filtered and evaporated.

Guaiaperol. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxvi. 243.) Guaiaperol is a synonym for guaiacolate of piperidine. It crystallises in needles or scales which melt at 79.8°C ., and are moderately soluble in water.

Thymol Iodide. (From *Amer. Drugg.*) This preparation is introduced as an external antiseptic. It is prepared by dissolving 50 grammes of thymol, 58 grammes of potassium iodide, and 50 grammes of sodium hydrate in 500 c.c. of water, and pouring this solution gradually into 2,500 c.c. of a strong solution of sodium chloride. The precipitate thus obtained is washed with water until it is free from chloride, dried at or below 27°C ., then powdered, and kept in stoppered bottles. The product contains 45 per cent. of iodine and has the composition $\text{C}_{20}\text{H}_{24}\text{O}_{21}\text{I}_2$.

Methyllorelin. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 828.) Methyllorelin ($\text{C}_9\text{H}_3\cdot\text{I}\cdot\text{O}\cdot\text{H}\cdot\text{C}_9\text{H}_3\text{N}\cdot\text{S}\cdot\text{O}_2\text{H} + \text{H}_2\text{O}$) is an antiseptic in the form of yellow lustrous needles or scales, which are insoluble in all the ordinary solvents.

Diiodosalicylic Esters. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 827, 828.) The author describes a methyl ester and an ethyl ester of diiodosalicylic acid, both of which are introduced as odourless and non-toxic substitutes for iodoform.

Menthoxol, Camphoroxol, and Naphthoxol. (*Nouv. Rem.*, xiv. 112.) These preparations are introduced by Wagner as potent oxidising antiseptics for wounds, and are stated to combine powerful germicide properties with freedom from irritating effects, besides being very efficient deodorants. They consist of 3 per cent. solution of hydrogen peroxide mixed with alcoholic solutions of either menthol, camphor, or naphthol. They are chiefly used in the treatment of suppurating wounds and abscesses. Full particulars as to their mode of application are given in *Deutsch. med. Wochenschr.*, 1897, No. 45.

Salitannol. (*Pharm. Zeitschr. für Russl.*, xxxvi. 696.) This preparation is introduced as an antiseptic for wounds, and is stated to combine the antiseptic action of salicylic acid with the properties of gallic acid or tannin. It is a condensation product of salicylic and gallic acids, and is obtained from a mixture of the two

acids by the action of phosphorus oxychloride. Its composition is represented by the formula $C_{14}H_{11}O_7$. It is described as a white amorphous powder, which melts at $210^{\circ}C$., and is insoluble in water, ether, chloroform, benzol, and in cold alkaline carbonates, almost insoluble in alcohol, and readily soluble in alkaline hydrates.

Iodocrol or Iodocarvacrol. (*Pharm. Zeit.*, xlii. 828.) This preparation is offered as a powerful antiseptic and substitute for iodoform, and is prepared, according to Cohn, by dissolving 2 grammes of carvol and 38 grammes of iodide of potassium in 40 grammes of a 40 per cent. solution of sodium hydrate. It is odourless, about five times as heavy as iodoform, and soluble in ether, chloroform, bisulphide of carbon, benzol, and in fatty and in volatile oils.

Airol Paste. (*Pharm. Centralhalle*, xxxviii. 423.) A paste composed of 1 part each of airol, glycerin, and mucilage of acacia, and 2 parts of white bole, is recommended by Bruns as an antiseptic dressing for surgical wounds. It is placed in a thick layer over the wound and extended by very gentle rubbing with the finger. It is stated to dry rapidly, and to combine high antiseptic powers with freedom from irritating action.

Paraformic Aldehyde (Paraformaldehyde) as an Antiseptic. B. H. Paul and A. J. Cownley. (*Pharm. Journ.*, 4th series, v. 101.) The authors recommend this substance as an antiseptic. Though it is insoluble, it is readily convertible into its soluble modification, formaldehyde. They consider it more advantageous to produce paraformaldehyde than formaldehyde for commercial use, as it is more readily manipulated and may be easily rendered soluble to a suitable degree of strength for antiseptic purposes. Where an antiseptic powder is required, the direct application of the paraformaldehyde as such is considered likely to be of great service. An account of the chemistry of the subject will be found in the original paper.

A New Combination of Urea and Formaldehyde as an Odourless Disinfectant. (From *Chem. Zeitung*.) This disinfectant, introduced by C. Goldschmidt, is obtained by allowing 5 kilogrammes of a 40 per cent. solution of formaldehyde to act on an alkaline solution of 1 kilogramme of urea for 24 hours. The white amorphous precipitate thus formed consists of 2 molecules of formaldehyde and 1 molecule of urea, and is insoluble in alcohol and ether, and soluble in hot water with partial decomposition. On exposure to air it is decomposed very slowly. Its solubility in cold dilute mineral acids distinguishes this preparation from the well-known

condensation product of formaldehyde and urea formed in acid solutions.

Eka Iodoform. (*Pharm. Zeitung*, xlii. 483, and *Therap. Monatsh.*, 1897, 381.) This name is given to a mixture of iodoform and paraformaldehyde, which A. Gottstein considers superior to iodoform as an antiseptic for the dressing of wounds.

Combinations of Iodoform with Albumin. (*Chem. Zeitung*, 1898, 106.) On mixing solutions of albumin and iodoform in the presence of alcohol or of some other liquid capable of precipitating albumin, a precipitate is obtained consisting of albumin and iodoform, from which after drying the latter can be again removed by any iodoform solvent. But if the precipitate is heated for several hours at 120° C., the greater part of the iodoform enters into firm combination with the albumin, so that it can no longer be removed by solvents. The preparation thus obtained is an almost odourless and sterilizable powder, possessing the antiseptic properties of iodoform.

Hydrargyrol. (*Nouv. Rem.*, 1897, No. 23, and *Apoth. Zeitung*, 1897, 852.) Hydrargyrol, according to Gautrelet, is a compound of the formula $C_6H_4.OH.SO_3Hg$, which is recommended as an antiseptic. It is prepared as follows:—105 grammes of sulphuric acid of 66° B. are allowed to act at a low temperature on 100 grammes of pure phenol, and the resulting mixture is then kept at 100° for 8 days, after which it is diluted with four to five times its volume of water, treated with powdered barium carbonate, and filtered. The paraphenylthionic acid thus obtained is digested at 100° C. for 24 hours with freshly precipitated mercuric oxide (from 212 grammes of mercury), the mixture then filtered, and the clear filtrate evaporated.

The resulting product forms brownish-red scales having a pleasant odour, a neutral reaction, and a specific gravity of 1.85. It is insoluble in absolute alcohol, and soluble in water and glycerin, yielding red solutions. Neither mercury nor phenol can be detected in it by the direct application of the usual reagents. It precipitates alkaloids and basic toxins, but not albumin. A solution containing 1:250 completely stops the growth or development of micro-organisms. The lethal dose for rabbits is 0.81 gramme per kilogramme of body weight, while for guinea-pigs it is 0.48 gramme; and it is therefore 75 times less poisonous than corrosive sublimate. It is moreover regarded as superior to the latter on account of its indifference towards albumin.

Mercauro. (From *Pharm. Zeitung*.) This name is given by Martin to a new antisyphilitic remedy, possessing also tonic and antiluetic properties. It consists of bromides of gold, arsenic, and mercury, and is stated to be very readily borne by the stomach.

Cresamine (Ethylenediaminecresol). (*Therap. Monatsh.*, 1898, 209.) Cresamine is a mixture of cresol with ethylenediamine, and forms a colourless liquid having a phenol-like odour; on exposure to the air it gradually assumes a pale yellow colour without undergoing any material change. Its solubility is much greater than that of cresol. It is stated to be a good antiseptic and disinfectant, and to have no irritating action on the skin. It is employed in ointments, poultices, etc., for eczema, and various forms of dermatitis.

Resol. (From *Nouv. Rem.*) This preparation is a disinfectant obtained by saponifying wood-tar with caustic potash and dissolving the resulting soap in methyl alcohol.

Formochlor. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 754.) Formochlor is a technical name given to a disinfectant consisting of a solution of calcium chloride in formaldehyde. For disinfecting rooms, etc., it is used in an apparatus constructed according to Trillat's system, in which it is heated under pressure.

Lysolveol. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 754, 795.) This disinfectant is a strong aqueous solution of phenols, cresols, fatty acids (chiefly oleic acid in combination with potash), resin acids, and a small proportion of hydrocarbon oils. It is soluble in water, and has a specific gravity of 1.022.

Pural. (*Deutsch. med. Zeit.*) This name is given to a disinfectant consisting of wood charcoal impregnated with carbolic acid, menthol and benzoic acid, compressed and moulded into small cylindrical rods. For use in sick rooms, etc., these are heated on one side by means of a burning lucifer match or candle, and then placed on a plate with the glowing side downwards.

Preparation of Tannalbin. E. Schmidt. (*Pharm. Zeitung*, xlii. 538.) Tannalbin (*Year-Book of Pharmacy*, 1896, 179) may be economically prepared by mixing 10 parts of a 10 per cent. solution of albumin with 6.5 parts of tannin solution, collecting the precipitate thus formed, and washing, pressing, and drying it at 30° C. The product is then powdered, sifted, and heated in thin layers to 120° C. for six hours.

Tannalbin should not have a strong astringent taste, and when digested with artificial gastric juice at 37° to 40° C., the greater part should remain undissolved; but it should dissolve almost

completely on prolonged digestion under the same conditions with a 1 per cent. soda solution.

Crealbin (Creolalbin). (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 892 and xxxvi. 57.) Crealbin, also termed creolalbin, is a compound of creolin and albumin intended for internal medication, and presents a certain analogy to ichthalbin and tannalbin. It is prepared by shaking 1000 parts of a 10 per cent. solution of albumin with a mixture of 100 parts of creolin and 1000 parts of water, and then adding a sufficient quantity of dilute hydrochloric acid (1:10) for complete precipitation. The excess of albumin remains in solution, while the crealbin is thus precipitated, and is then collected on a straining cloth and washed, pressed, dried and powdered. The resulting fine powder is further desiccated by heating it for three hours in an air-bath at 115–120° C. 100 parts of albumin yield 100 parts of crealbin.

Iodocasein (Caseiodin). A. Liebrecht. (*Ber. der deutsch. chem. Ges.*, xxx. 1825.) This name is given to a substance analogous to iodothyryn, which may be obtained from casein periodide by a treatment similar to that adopted by Baumann in preparing iodothyryn from thyroid gland (boiling with sulphuric acid, etc.). It is a white substance containing on an average 8·7 per cent. of iodine. It has been tried by Prof. Kocher with very good results in the treatment of goitre. The casein periodide, from which this preparation is made, is obtained by heating casein with one-fourth of its weight of iodine, and extracting the excess of the latter from the resulting brown powder by means of ether. It is a yellowish powder soluble in hot dilute alcohol.

Bromalbumin (Bromosin). O. Loew and S. Takabayashi. (*Journ. Chem. Soc.*, from *Bull. Coll. Agric. Imp. Univ. Tokyo*, 1897, iii. 237–240; also *Pharm. Centralhalle*, xxxviii. 357.) Bromalbumin, which has been in use for some time under the name of “bromosin,” is now prepared by mixing equal weights of albumin and bromine, which must be cooled during the operation, and then heating the mixture at 60° for two days. The product is washed successively with water, sulphurous acid, dilute sodium carbonate, 50 per cent. alcohol, and absolute alcohol. The substance, dried at 100°, contains 10·64–11·0 per cent. of bromine.

Experiments with 1 per cent. solutions of bromalbumin, with and without peptone and cane-sugar respectively, showed that the compound is not favourable for the development of microbes (putrefaction microbes and bacilli of anthrax) in absence of air, even

in presence of sugar, but that it does not prevent development in presence of peptone.

Bromosin contains 13·1 per cent. of firmly combined bromine, and, unlike albumin, it yields no sulphur on boiling with alkalis. No tyrosin is formed on decomposition with mineral acids, and Millon's reagent does not produce any red coloration on boiling; but the biuret reaction is readily obtained. Ordinary albumin subjected to partial oxidation with potassium permanganate behaves in a similar manner.

Triphenyl Albumin. M. Shimada. (*Chem. Centralbl.*, 1897, 18.) Triphenyl albumin is described as a good medium for the culture of bacteria, and is prepared by heating dry powdered egg albumin with ten times its weight of phenol on a water bath, then precipitating with alcohol, and washing the flocculent precipitate with alcohol and water. The product is free from smell or taste, and is readily soluble in phenol, but insoluble in hot water, alcohol and alkalis.

Sanatogen. (*Pharm. Zeitung*, from *Münch. med. Wochenschr.*, 1898, No. 9.) The preparation introduced by Vis under this name is a casein-soda compound of glycerophosphoric acid. It is readily soluble and has a more pleasant taste and odour than other casein combinations. It contains 13·0 per cent. of nitrogen. It is given in teaspoon doses mixed with soup, cocoa, or other warm liquids. Before being added to these it is first intimately mixed with a small quantity of water.

Ferralbumose. (*Pharm. Centralhalle*, from *Pharm. Weekbl.*) According to Dokkum, this iron preparation is prepared by treating lean chopped beef with artificial gastric juice, then freeing the filtered liquid from albumin, neutralising with sodium carbonate, again filtering, and evaporating to dryness in vacuo. A 10 per cent. solution of this albumose is mixed with a 10 per cent. solution of ferric chloride until precipitation is complete. The precipitate is dried and powdered.

In order to determine the percentage of iron in this preparation, 1 gramme of ferralbumose is incinerated, and the ash dissolved in hydrochloric acid with the aid of a little potassium chlorate. The solution is evaporated on a water-bath, then diluted with water, and titrated with decinormal sodium hyposulphite.

Carniferrol. O. Bukofzer. (*Pharm. Zeitung*, 1897, 546.) A dietetic preparation, introduced under this name, is stated to contain 10 per cent. of meat peptone and 0·4 per cent. of iron. It

is said to promote digestion and to act as a general tonic in anæmic and other weakened conditions.

Sanose. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 692.) Sanose is a dietetic preparation consisting of 80 per cent. of casein and 20 per cent. of albumin in the form of a white, odourless and tasteless powder which yields a milk-like emulsion with water. Schreiber and Waldvogel (*Deutsch. med. Wochenschr.*, 1897) recommend it to be given in milk or cocoa, and also in soups. Bread containing 10 per cent. and cakes containing 20 per cent. of sanose are recommended to diabetic patients. At 40° C., sanose is readily digested by either trypsin or pepsin-hydrochloric acid.

Gastromyxin. G. Herites. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 692.) This pepsin preparation is obtained from the mucous membrane of the stomach of bullocks, and is recommended as a digestive and strengthening remedy in dyspepsia, catarrh of the stomach, anæmia, hysteria, and tuberculosis. It is a yellowish grey powder having an aromatic odour.

Miscible Tar Oil. (*Journ. de Pharm.* [6], v. 328. From *Pharm. Journ.*) Heavy tar oil, which is largely used as a deodorant and disinfectant, is rendered easily miscible with water to a uniform and more or less permanent emulsion by the employment of alkaline resin soap. Fegon prepares the soap basis from resin, 100; soap-maker's lye, 95; distilled water, 200; commercial oleic acid, 40 parts. The resin is dissolved in lye and the water by boiling. The resin soap is then evaporated to 200 parts, cooled, and the oleic acid added. Soft soap may be substituted for the oleic acid; in this case only 85 parts of lye are used, and the mixture of the two soaps is evaporated down to 240 parts. To every such 240 parts of resin soap basis sufficient heavy tar oil is added to produce 1000 parts. The soap is gently heated and mixed gradually with 400 parts of the oil; the temperature is then carefully raised just short of boiling, until a perfect solution is effected; the rest of the oil is then added. During cooling the vessel should be covered over to prevent too great evaporation of water, of which the soap should retain about 50 parts. Finally the mixture is filtered or strained through a cloth.

Paskola Tabloids. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 798.) These are purgative tabloids, each of which contains 0·72 gramme of extract of cascara sagrada, 0·24 gramme of sugar, 0·18 gramme of powdered senna pods, and the same quantity of powdered elm bark and liquorice root.

Captol. (*Zeitschr. des oesterr. Apoth. Ver.*, li. 691, 692, and lii. 7 and 279.) This name is given to a condensation product of tannin and chloral which is recommended as a medical cosmetic for seborrhœa. It is a dark-brown, hygroscopic powder, slightly soluble in cold water and more readily soluble in hot water or alcohol. It is not affected by acids, but is decomposed by alkalis which impart to it a dark colour. When heated with sodium hydrate and aniline, it gives an intense isonitrile reaction. With iron salts it produces a dark coloration, which disappears on the addition of hydrochloric or oxalic acid. It is applied to the head in a 1–2 per cent. alcoholic solution, night and morning. Eichhoff recommends for this application a captol spirit (*Spiritus captoli compositus*), having the following composition:—

Captol	} of each	. . . 1 gramme.
Tartaric acid		
Resorcin		
Salicylic acid		0·7 "
Castor oil		0·5 "
Alcohol (65 per cent.)		100·0 grammes.

Gallacetophenone (Trioxycetophenone). (*Zeitschr. des oesterr. Apoth. Ver.*, xxxvi. 79.) This preparation has a composition corresponding to the formula $C_6H_2(OH)_3 \cdot CO \cdot CH_3$, and is a yellow powder, soluble in alcohol, ether, and hot water. It is used in the form of a 10 per cent. solution or ointment in psoriasis and other skin diseases.

Sinapol. (From *Apoth. Zeitung*.) Sinapol is an appellation given to an external remedy of the following composition:—

Aconitine.	. . . . .	0·5	gramme.
Menthol			
Essential oil of mustard	} of each	30	grammes.
Castor oil.			
Spirits of rosemary (1:15)	. . . . .	120	"
	. . . . .	780	"

It is used for rheumatism and neuralgia.

Phenol Sulpho-Ricinoleate. (*Münch. med. Wochenschr.*, 1897, No. 37.) This preparation, which was first introduced into therapeutics by Ruault, and subsequently recommended by Heryng, is stated to be a mixture of pure phenol and sulpho-ricinoleic acid. It is used in 20 to 30 per cent. solution in phthisis of the larynx, and is applied every second or third day. The condition of the patients was invariably improved by this treatment, though no complete cure could be effected.

Iodovasol. (*Pharm. Zeit.*, xlii. 63.) This preparation is introduced as a stable iodised ointment basis. It is prepared by treating an excess of oleic acid with iodine chloride, washing the resulting oily liquid first with water, then with dilute solution of sodium thiosulphate, finally drying with anhydrous sodium sulphate, and mixing with a prescribed quantity of vaselin. A little absolute alcohol is then added, and the mixture treated with a stream of ammonia gas until the oleic acid is saturated. The resulting brown liquid contains 7 per cent. of iodine. It is very hygroscopic, and should therefore be kept in well-closed vessels.

Sanal. (*Pharm. Zeitschr. für Russland*, xxxvi. 3246.) The ointment introduced under this name is stated to consist of bole, litharge, calamine, Peruvian balsam, beeswax, and vaselin. It is recommended as an application for open wounds.

Antirheumatin and Antitussin. (*Pharm. Zeit.*, xlii. 546.) *Antirheumatin* is a mixture of 1 part of fluorophenetol and 5 parts of difluorodiphenyl, in the form of an ointment, and is employed externally in rheumatism, lumbago, and influenza.

The name *antitussin* is given to difluorodiphenyl, and is used externally in the form of an ointment in whooping-cough. It is credited with sedative and hypnotic effects.

Savonal. (*Pharm. Zeitung*, 1897, 546.) The name savonal is applied by Müller and Grube to a pure neutral soft soap intended as a basis for the external application of numerous remedies. It is prepared by saponifying pure olive oil with cold alcoholic potash solution. A portion of the resulting alkaline liquid is cooled by means of ice, and mixed with just sufficient hydrochloric acid to precipitate the fatty acids. The precipitate is collected, and then gradually added to the main portion of the original alkaline alcoholic solution until the latter is exactly neutralised. After evaporation of the alcohol from the neutral solution, the pure soap or savonal is obtained in the form of a soft unctuous substance. From this, liquid savonal is prepared by adding a small quantity of glycerin and sufficient water to bring the specific gravity to 1.050–1.055. Savonal serves as a basis for many combinations, such as with salol, phenol, sozoidol, naphthol, iodoform, mercuric chloride, resorcin, chrysarobin, tannin, potassium iodide, etc.

Cearin. P. Siedler. (*Ber. der deutsch. Pharm. Ges.*, 1898, 127.) This ointment base is prepared by melting 1 part of white carnauba wax with 4 parts of liquid paraffin, and stirring the

mixture until quite cold. It is a snow-white and perfectly uniform ointment, which keeps better and takes up a much larger proportion of water than paraffin ointment.

Resorcin Paste. (*Zeitsch. des oesterr. Apoth. Ver.*, xxxv. 723, from *Pharm. Zeitung*.) Schmatolla suggests that this paste should be prepared by powdering the resorcin very finely with the aid of ether, and then incorporating it with zinc-amylum paste.

Sapomenthol. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 625.) This name is given by Matula to a liniment consisting of soap, menthol, ammonia, camphor, absolute alcohol, and some essential oils. It is used in rheumatism and gout.

Quinosol (Chinosol) in Leprosy. F. J. Müller. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 858.) The author reports having tried this remedy in leprosy with encouraging results. Particulars of the cases will be found in the original paper.

Antiseptic Inhalation in Phthisis. (*Mod. Med.*, vi. 185. From *Pharm. Journ.*) Riley has found the following inhalation, combined with other means of treatment, serviceable in cases of pulmonary tubercule:—

Oil of Scotch Pine	30 m
Oil of Eucalyptus	60 m
Oil of Cassia	30 m
Menthol	20 grs.
Fluid Extract of Balm of Gilead buds .	60 m
Creosote	60 m
Tincture of Benzoin	60 m

The patient is placed in a closed chamber, the air of which is saturated with the vapour produced by nebulising this mixture.

Ozone Inhalations in Whooping Cough. (From *Brit. Med. Journ. Epit.*) Doumer finds ozone inhalations very successful in cases of whooping cough, both in children and adults. Broken rest was greatly improved, and in one case vomiting was speedily checked. The frequency of the paroxysms was diminished, though a relapse occurred upon discontinuing the remedy. A cure was effected after twelve to twenty-seven inhalations.

Glycyrrhizin Cough Lozenges. F. R. Vechtmann. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 481, from *Pharm. Weekbl.*) In response to a request from J. E. de Vrij, the author has prepared these lozenges intended for the relief of cough and other affections

of the respiratory passages, and publishes the following recipes for their preparation:—

- | | | | |
|-----|-----------------------------|-------|---------------|
| (1) | Glycyrrhizin. Ammoniat. | . . . | 1.0 gramme. |
| | Pulv. Amyli | | 20.0 grammes. |
| | Sacch. Alb. | | 80.0 „ |
| | Ol. Amygd. Amar. | | 1 drop. |
| | M. f. trochisci 100. | | |
| (2) | Glycyrrhizin. Ammoniat. | . . . | 1.0 gramme. |
| | Pulv. Amyli | | 20.0 grammes. |
| | Sacch. Alb. | | 80.0 „ |
| | Codein. Hydrochlor. | | 0.8 gramme. |
| | Ol. Amygd. Amar. | | 1 drop. |
| | M. f. trochisci 100. | | |

(3) Same as No. 2, but containing 2.0 grammes instead of 0.8 gramme of codeine hydrochloride.

Strontium Salicylate in Gout and Rheumatism. (*Bull. Gén. de Thérap.*, ii. 275.) Strontium salicylate, in doses of 0.6 to 1 gramme, is found to be superior to the alkali salicylates in gouty and chronic rheumatic affections. It is stated to be more efficient in its action and to have the advantage of not producing any disturbing effect on the digestive organs.

Injections of Glycerophosphates for Sciatica. (*Bull. Gén. de Thérap.*, cxxxii. 433. From *Pharm. Journ.*) Robin finds that excellent results are obtained by the deep injection of a solution of glycerophosphates into the painful part. The most useful solution is that of sodium glycerophosphate, consisting of 1 part of the salt in 4 parts of water. A second solution is sometimes employed, containing, in each cubic centimetre, glycerophosphate of lime 4 centigrammes, of magnesia 4, of potassium 4, and of sodium 13 centigrammes. A third solution containing the addition of 5 centigrammes of iron instead of 5 of sodium glycerophosphate is also used. The dose of each of these is 1 c.c. or more, up to 4 c.c., but as a rule 2 c.c. will be found to be sufficient. The first solution is generally to be preferred, since it does not give rise to pain. Success is not always obtained with the first or even the second injection; a series is sometimes necessary to effect a cure. Chronic cases which are not absolutely cured are greatly relieved by the treatment.

Compound Glycerin Tonic. W. L. Cliffe. (*Amer. Journ. Pharm.*, 1898, 201.)

Gentian Root, No. 40	3½ ounces Troy.
Sherry Wine, q.s. to percolate	26 fluid ounces.

To percolate add :—

Extract of Dandelion	4½ ounces Troy.
Glycerin	26 fluid ounces.
Dilute Phosphoric Acid	4½ " "
Tincture of Cardamom comp.	} of each 6½ fluid ounces.
Syrup of Lemon	
Syrup of Orange Peel	

Intestinal Antiseptic Mixture. (*N.Y. Med. News*, April 2nd, 1898.)

R. Salol	3i.
Thymol	gr. xxxvi.
Bismuth. Subnit.	5ii.-iv.
Mucilag. Acacia	5ii.
Syr. Tolutan	5iv.

M.—Sig.: One teaspoonful three times daily.

Expectorant Pills. (*Chemist and Druggist*, from *El Memorandum*.)

Gum. Ammoniac.	5iiss.
Pulv. Ipecac.	ʒij.
Pulv. Glycyrrh.	5iiss.
Acid. Benzoic.	5ij.
Sapo. Castil.	q.s.

Mass and divide into 150 pills.

One to be taken, three to six times per day, for chronic pulmonary catarrh.

Compound Cascara Pills. (*Pharm. Zeitung*, xlii. 228.)

Extract of Cascara	2 grammes.
Extract of Rhamnus Frangula	1 gramme.
Powdered Aloes	4 grammes.
Powdered Gentian Root	4 " "

Hard Soap, sufficient to make 80 pills.

Potassium Iodide Pills. M. Bultot. (*Repert. de Pharm.*, 1897, 826.) For administering potassium iodide in pill form the author suggests the following formula :—

Potassium Iodide	0.20 gramme.
Wheat Starch	0.05 " "
Dextrin	0.02 " "
Simple Syrup	q.s.

F. pil. I.

The author prefers dextrin to gum arabic, as it has no acid reaction. The pills are rapidly dried, rolled in French chalk, and

stored in a dark place. They remain white, and disintegrate and dissolve readily in water or in the stomach.

The Administration of Cod Liver Oil. (*Amer. Journ. Pharm.*, 1898, 113.) Bricemoret (*Journ. des Pract.*, October 23rd, 1897) recommends the following formula:—

R Cod Liver Oil	15 ounces.
Syrup of Tolu	7½ "
Tincture of Tolu	12 drops.
Essence of Cloves	2 "

A tablespoonful two or three times a day, the bottle to be well shaken each time.

Picric Acid in Acute Eczema. (*Brit. Journ. Dermatol.*, ix. 298.) The application of a 1 per cent. solution of picric acid has been found by Gaucher to be very useful in acute vesicular eczema. The diseased part is painted with the solution and then covered with wool or buttercloth, soaked in the solution, the application being repeated every second day. The irritation is rapidly allayed by this treatment.

Formulæ for Picric Acid Preparations for Antiseptic Use. M. Debuchy. (*Chemist and Druggist*, from *Nouv. Rem.*) For the preparation of antiseptic dressings the following solution is used:—

Methylated Ether	Oij.
Sterilised Beeswax	5ijss.
Picric Acid	3ij.

Dissolve by shaking.

This quantity of solution is sufficient for saturating 1 lb. of cotton-wool, gauze, bandage, or other dressing, and the strength of the dressing when dry is about 13 per cent.

A jelly which is a useful application for many purposes is made as follows:—

Isinglass	3j.
Gum Arabic	5iss.
Water	5x.

Dissolve by the aid of heat, and, while warm, add the following solution:—

Picric Acid	5ivss.
Pure Methylic Alcohol	3iv.

Mix well by stirring.

This contains about 20 per cent. of picric acid.

For an adhesive plaster use the following:—

Resin-plaster	3x.
Yellow Wax	3j.
Gum Dammar	3ss.

Melt together, and add cautiously a solution of—

Picric Acid	3i.
Pure Methylic Alcohol	3xviii.

Fowler's Solution as an External Remedy in Lupus. (*Brit. Journ. Dermatol.*, ix. 289.) Good results have been obtained in the treatment of lupus erythematosus with the following lotion:—

Liquor Fowleri	4 grammes.
Aqua Dest.	20 to 30 "
Chloroformi	2m

To be applied by means of a camel-hair brush to the affected region night and morning, being allowed to dry on the skin. In the course of the fifth day an increase of swelling and redness takes place. The lotion is then stopped and some simple powder or paste applied until this again subsides, which occurs in four or five days. The painting is then resumed. Within ten or eleven weeks a cure will probably be effected without leaving a scar.

Salicylated Creosote Paste. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 457.) This preparation is recommended by Unna for lupus, and is prepared according to the following recipe:—

Acid. Salicyl. Cryst.	40 grammes.
Creosoti	80 "
Cerati Simpl.	60 "
Cere Alb.	20 "

Glycerinum Lacto-Carbohicum. (*Pharm. Centralhalle*, xxxviii. 458.) This preparation is made by mixing 1, 2, or 5 grammes of carbolic acid with 2, 4, or 10 grammes of lactic acid and 20 grammes of glycerin. It is applied by means of a camel-hair brush, two or three times a day in tubercular affections of the throat, and is intended to combine the effects of the phenol with the healing properties of lactic acid. If the throat be very irritable the application may be preceded by one of cocaine.

Eucalyptus Opodeldoc. (*Bull. de Pharm. and Pharm. Centralhalle.*) 90 grammes of olive oil soap are dissolved in 750 grammes of alcohol, and to this solution are added 45 grammes of camphor,

7·5 grammes of menthol, 22·5 of oil of eucalyptus, and 45 grammes of solution of ammonia.

Menthol Collodion. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 798.) Under this name, a preparation consisting of a mixture of 3 to 6 grammes of menthol and 20 to 24 grammes of collodion, is recommended by Namé in contusions. The affected parts are carefully cleaned and then washed with ether, after which the preparation is applied by means of a brush. The application stills the pain and promotes rapid healing.

Anusol Suppositories. (*Pharm. Centralh.*, xxxviii. 242.) Anusol, a previous notice of which will be found in the *Year-Book of Pharmacy*, 1897, 249, is chiefly used for piles, in the form of suppositories made according to the following recipe:—

Anusol	7·5 grammes.
Zinc Oxid.	6·0 "
Balsam. Peruv.	1·5 gramme.
Ol. Theobromæ	19 grammes.
Ung. Cerae	2·5 "
F. Suppos. 12.	

Ichthyol Suppositories. (*Pharm. Centralh.*, xxxix. 7.) Ichthyol suppositories require a certain addition of wax to bring the basis to a firm consistence. Eschenburg states that the melting-point of cacao-butter and wax mixtures (which is higher than the temperature of the body) is considerably lowered by the addition of ichthyol. For instance, a mixture of 3 parts of cacao-butter, 0·2 part of white wax, and 1 part of ichthyol melts at 36° C., and 2 parts of cacao-butter, 0·05 part of white wax, and 0·5 part of ichthyol at 33° to 34° C. The ichthyol should be added when the basis just commences to congeal.

Liquid Tar Soap. (*Pharm. Centralh.*, xxxviii. 543.) From *Pharm. Journ.*)

Soft Soap	800 grammes.
Glycerin	200 "
Liquor Carbon. Deterg.	50 "

Digest these on the water bath until the alcohol is entirely evaporated. When cold mix with:—

Oil of Melissa	60 gtt.
„ Geranium	80 "

Set aside and filter in a hot water funnel.

Linimentum Exsiccans. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 524.) Lupp recommends the following formula for preparing this liniment:—12 grammes of powdered tragacanth are intimately mixed with 15 grammes of glycerin and then with successive quantities of water, each of 100 grammes, until the mixture amounts to 500 grammes. If this liniment is prescribed along with lanolin, the mixture should be warmed until the latter has melted, and then continuously stirred until cold.

Carbolised Resin as a Styptic. (*Pharm. Journ.*, from *Brit. Journ. Dent. Sci.*, xl. 425.) Van Pelt Vicks finds carbolised resin an efficient styptic in hæmorrhage. He gives the following formula:—

Pulverised Resin (common)	. . .	5iv.
Carbolic Acid (95 per cent.)	. . .	5iii.
Chloroform	. . .	5ii.

Make a short, thick cotton rope larger than the wound to be treated, moisten the end well with the compound, and plug the cavity tightly. The bleeding will be found to cease rapidly.

Diachylon Powder. (*L'Union Pharm.*, xxxviii. 298.) 2 parts of acetate of lead are dissolved in 10 parts of water, and then mixed with a solution of 3 parts of Castile soap in 15 parts of water. 10 parts of starch and 3 parts of boric acid are added to the mixture and intimately mixed with it. According to another formula, this preparation is obtained by dissolving 15 parts of lead plaster and 5 parts of beeswax in 50 parts of ether, then adding 90 parts each of French chalk and starch powder, and 3 parts of boric acid, and perfuming the mixture with oil of bergamot.

Liniment for Rheumatism, Sciatica and Lumbago. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxvi. 57.)

Sodium Salicylate	. . .	15 grammes
Oil of Cajeput	. . .	2 "
Oil of Eucalyptus	. . .	1 gramme
Ammoniated Soap Liniment	. . .	15 grammes
Rectified Spirit	. . .	200 "

Ointment for Acute Articular Rheumatism. (*N. Y. Med. Journ.*, March 26th, 1898. From *Amer. Journ. Pharm.*)

R. Vaseline	. . .	25 parts
Salicylic Acid	. . .	4 "
Sodium Salicylate	. . .	3 "
Extract of Belladonna	. . .	1 part

M.—To be applied and covered with cotton.

Application for Ulcers of the Leg. (*Phil. Med. Journ.*, April 8th, 1898.)

R̄	Carbolic Acid	. . . . .	30 grains
	Boric Acid	. . . . .	2½ drachms
	Powdered Camphor	. . . . .	2 "
	Ichthyol	. . . . .	5 "
	Oil of Sweet Almonds.	. . . . .	2½ "
	Zinc Ointment	. . . . .	3 ounces

Apply topically.

Lotion for Nettle-Rash. (*Amer. Journ. Pharm.*, June, 1898.)

R̄	Menthol	. . . . .	gr. xl.
	Chloroform	. . . . .
	Ether	. . . . .
	Spirits of Camphor	} āā	ʒiii.

To be used as a spray or lotion. The affected part should then be dusted with powdered starch or oxide of zinc.

Application for Bees' Stings. (*Practitioner*, February, 1895.) According to Lauger, the best treatment consists in a subcutaneous injection of a 2 to 5 per cent. solution of potassium permanganate, as this salt destroys the poison.

Application for Erysipelas. (*Amer. Journ. Pharm.*, April, 1898.)

R̄	Aristol.	. . . . .	gr. xx.
	Collodii	. . . . .	ʒi.

M. Sig.: Apply freely with a camel's-hair brush over and slightly beyond the inflamed area. This should be renewed as it scales off.

The intense burning pain is said to be relieved and the progress of the disease favourably influenced by the use of this application.

Ointment for Enlarged Glands. (*Amer. Journ. Pharm.*, from *N. Y. Med. News*, February 19th, 1898.)

R̄	Ichthyol	. . . . .
	Ung. Hydrarg.	} āā	ʒi.
	Ung. Bellad.	. . . . .
	Ung. Petrolati	. . . . .	ʒss.

M. Ft. ung. Sig.: Apply night and morning over the affected glands, using friction until absorbed.

Ointment for Mumps. (*Amer. Journ. Pharm.*, March, 1898.)

R̄	Ichthyol	. . . . .
	Plumbi Iodi.	} āā	gr. xlviii.
	Ammon. Chloridi	. . . . .	gr. xxx.
	Vaselin	. . . . .	ʒi.

M. Ft. ungt. Sig.: Apply with friction over the swollen glands three times daily.

Removal of Warts. (*Med. News*, January 8th, 1898.) Warts can be removed painlessly, and without leaving scars, by applying a supersaturated solution of potassium bichromate once daily.

Application for Warts. (From *Pharm. Rundschau*.) 10 grammes of glacial acetic acid, 20 grammes of precipitated sulphur, and 50 grammes of glycerin are intimately mixed, and this mixture is applied to the warts once or twice daily by means of a camel-hair brush.

Applications for Chapped Hands. (*Bull. Gén. de Therap.*, cxxiii. 189. From *Pharm. Journ.*) (1) Lanolin, 900 grammes; liquid vaselin, 25 grammes; vanillin, 5 centigrammes. (2) Distilled water, 10; levulose, 1; perfume as required. (3) Alcohol, 90 per cent., 80; glycerin, 35; rose water, 30; salol, 2. The last two lotions should be applied after washing the hands in tepid water with non-irritant soap, and drying. The lotion is applied to the backs of the hands and allowed to dry on. (4) Zinc oxide, 13; glycerin, 45; rub together, and add lanolin, 40. To be applied at night.

Applications for Chilblains. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxvi. 9.) Either of the following preparations is recommended to be applied every evening:—

- | | | | | | | | | |
|-----|---------------------|---|---------|---|---|---|---|------------|
| (1) | Resorcin | . | . | . | . | . | . | 1 gramme |
| | Ichthyol | | | | | | | |
| | Tannic Acid | } | of each | . | . | . | . | 2 grammes |
| | Distilled Water | . | . | . | . | . | . | 10 " |
| (2) | Resorcin | . | . | . | . | . | . | 4 grammes |
| | Powdered Gum Arabic | . | . | . | . | . | . | 2½ " |
| | French Chalk | . | . | . | . | . | . | 1 gramme |
| | Distilled Water | . | . | . | . | . | . | 7½ grammes |

Chlorinated Lime for Chilblains. C. Binz. (*Pharm. Zeitung*, xlii. 733.) The author recommends an ointment composed of 1 part of bleaching powder and 9 parts of paraffin ointment. The inflamed parts are covered and rubbed with this ointment for about five minutes at bedtime, and are then protected by means of a glove or stocking. The inflammation and pain generally disappear within a week.

Neither lard nor lanolin are suitable for preparing this ointment since these substances rapidly absorb the free chlorine.

Application for Herpes. (*Therap. Gaz.* [3], xiii. 688.) The following combination is recommended :—

Resorcin	. . . . .	45 grains.
Cocaine	. . . . .	15 "
Alcohol	. . . . .	3 fluid ounces.

Gelatin as a Styptic. M. Carnot. (*Repert. de Pharm.*, ix. 454.) The author finds that the local application of a solution of gelatin to bleeding surfaces rapidly causes the formation of a clot, and thus arrests hæmorrhage. He employed a sterilised solution containing 5 per cent. of gelatin and 0·7 per cent. of sodium chloride. Injections of gelatin solutions have also proved very prompt in their hæmostatic action in cases of rectal hæmorrhage.

Nasal Douche for Acute Catarrh. (*Pharm. Zeitschr. für Russl.*, xxxvi. 97.) A solution of 1 part of hydrochlorate of quinine in 90 parts of water, applied as a douche, is recommended as very efficient in all cases of acute nasal catarrh.

Snuff for Coryza. (*Pharm. Zeit.*, xlii. 354.)

Camphor	. . . . .	5 parts.
Tannin	. . . . .	5 "
Milk Sugar	. . . . .	1 part.

M.

Elastic Coating for Wounds. J. Klein. (*Therap. Monatsh.*, 1897, 238.) An elastic coating for small wounds, which is very adhesive and resists the action of water, may be obtained by intimately incorporating 1 part by weight of Peruvian balsam with 9 parts of collodion.

Depilatory Liquid. (*Pharm. Zeitung*, xlii. 167.)

Alcohol	. . . . .	120 grammes.
Collodion	. . . . .	350 "
Iodine	. . . . .	7·5 "
Oil of Turpentine	. . . . .	15 "
Castor Oil	. . . . .	20 "

This solution is applied in a thick layer. When, after drying, the pellicle thus left is removed, the hairs will come off with it adhering to its surface.

Application for Mange. (*Pharm. Journ.*, from *Vet. Rec.*, x.) Issleit recommends the following application, which he calls scabinol, for mange in the dog :—Sapo mollis, 4 parts; β -naphthol, 1 part; styracis, 2 parts; tobacco extract, 3 parts. To be applied to one-third of the skin at the most for three consecutive days.

After three applications wash the whole of the body with dilute scabiol (a tablespoonful to a quart of water).

Antiseptic Crayons. L. Adrian. (*Nouv. Rem.*, xiii. 483.

Corrosive Sublimate . . .	0.500 gramme.
Powdered Talc . . .	25.000 grammes.
Gum Tragacanth . . .	1.500 "
Distilled Water . . .	} āā q. s.
Glycerin . . .	

For 10 crayons.

In place of the corrosive sublimate a number of medicinal substances may be used as antiseptics, as boric acid, iodoform, phenol, salol, iodol, ichthyol, etc. Astringent and antiseptic crayons are prepared by using tannin, alum, antipyrine, ergotin, or ferric chloride. Resolvent crayons are made with potassium iodide, and sedative crayons with belladonna, morphine, cocaine, etc.

Starch, dextrin or sugar may be employed to replace part of the tragacanth.

Fumigating Paper. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxv. 503.) 50 grammes of benzoin, the same quantity of balsam of tolu, and 10 grammes of storax are extracted with 300 grammes of alcohol; the solution is filtered and the filtrate mixed with 10 grammes of Peruvian balsam, 20 drops of oil of cassia, and 20 drops of oil of lavender. Strips of paper are soaked in the resulting liquid, and then allowed to dry.

Charta Antiasthmatica (Asthma Paper). (*Chemist and Druggist*, li. 369.)

Potassium Nitrate . . .	17 parts.
Extract of Stramonium . . .	10 "
Sugar . . .	20 "
Hot Water . . .	100 "

Dissolve the solids in the hot water, and in this solution saturate white filter-paper, and dry.

Solvents of Gun-Cotton. T. Schlumberger. (*Pharm. Centr.*, xxxviii. 722.) The author states that with the aid of certain salts, such as ammonium chloride, calcium chloride, magnesium chloride, aluminium chloride, zinc chloride, potassium acetate, or ammonium acetate, gun-cotton can be readily dissolved in alcohol without the addition of ether. The pyroxylin may either be dissolved in an alcoholic solution of one of these salts, or it may be first impregnated with the saline substance and then dissolved in alcohol.

Textiloid a Substitute for Gutta-Percha. (*Pharm. Zeitung*, from *Chem. Indust.*) The basis of textiloid is an oxidation product which Cadoret calls "resinolin." This is prepared by saponifying 1 part of a suitable oil with 4 parts of a metallic carbonate, treating the soap with 1 part of nitric acid, then separating the liquid from the fatty matters, and saponifying the latter with 1 part of caustic alkali. The soap is again treated with acid, and the liberated resinoid substance purified by dissolving in ether or alcohol and evaporating the solvent. 100 parts of the resinolin thus obtained are mixed with 20 to 30 parts of either oxide of zinc, magnesia, or kaolin, and then with 60 parts of methyl alcohol; the whole is allowed to stand for three or four hours, and then well worked through by means of horizontal revolving cylinders at about 30–40° C. for about two hours. By this time the alcohol will be eliminated from the paste by evaporation, and the latter is now subjected to a pressure of 200 to 300 atmospheres in hydraulic presses heated to 80–90° C. A suitable consistence will thus be attained after about five or six hours, and the mass can then be moulded as desired.

Aluminised Gutta-Percha, a New Filling for Teeth. F. W. Bliss. (*Chemist and Druggist*, from *Pacific Stomatol. Gaz.*)

White Gutta-percha	8 parts.
Aluminium Filings	5 "
Oxide of Zinc	1 part.
Chalk	$\frac{1}{2}$ "
Mix well.	

This mixture (aluminised gutta-percha) is easily manipulated and holds its position in the cavity when firmly packed.

Paste for Killing Tooth Nerves. (*Zeitschr. des oesterr. Apoth. Ver.*, li. 797.) The arsenical paste in use consists, according to Schuh, of equal parts of arsenious acid and morphine hydrochloride, mixed with liquefied carbolic acid, to a paste; 5 per cent. cocaine hydrochlor. is then added.

Application for Dental Caries. (*Gaz. hebd. de méd. et de chir.*, February 10th, 1898. From *Amer. Journ. Pharm.*)

R. Crystallized Carbolic Acid	} each 2 parts.
Essence of Lemon	
Alcohol	
	10 "

M.—The cavity is washed and dried, and a little pellet of cotton soaked in the solution is inserted. Over this another pellet of cotton charged with tincture of benzoin is placed. The lemon is used simply to mask the odour of the carbolic acid.

Toothache Drops. (From *Western Druggist*.) A mixture of equal parts of phenol, camphor, chloral hydrate, menthol, and glycerin is recommended. The powdered camphor and chloral are mixed first, the menthol is then added, and finally a warmed mixture of the phenol and glycerin.

New Formulæ for Tooth Powder. (*Pharm. Zeitung*, xlii. 355.)

(1)	Sodium Chloride	1 gramme.
	Myrrh	1 "
	Powdered Soap	0.5 "
	Precipitated Chalk	50 grammes.
	Oil of Rose	q.s.
(2)	Menthol	0.1 gramme.
	β -Naphthol	0.05 "
	Saccharin	0.025 "
	Powdered Soap	0.5 "
	Precipitated Chalk	50 grammes.
	Oil of Rose	q.s.

Potassium Chlorate as a Tooth Powder. (*Brit. Journ. Dent. Soc.*, xl. 323. From *Pharm. Journ.*) Unna finds that a small quantity of chlorate of potassium, spread on the tooth-brush and rubbed on the gums in the ordinary manner, acts both as an anti-septic and as a deodorant, as well as strengthening the gums. Nothing seems so thoroughly to remove *fetor oris*, even in cases which have been treated unsuccessfully with internal medicines.

Carbolic Tooth-Powder. (*Chemist and Druggist*, lii. 772.)

Kaolin	3xij.
Kieselguhr or Dimatos	3iv.
Carbolic Acid	3ss.
Powdered Ext. Quillaia	3j.
Eosin	gr. iij.
Otto of Rose (stearoptene-free).	℥v.

Dissolve the eosin in 3j. of water and triturate with 2 oz. of kaolin till well mixed. Mix the carbolic acid and otto with the kieselguhr, then mix all the ingredients together and sift.

Salol Dentifrice. (*Chemist and Druggist*, li. 369.)

Salol	2.5 grammes.
Rectified Spirit	97 "
Oil of Peppermint	50 centigrammes.
Oil of Cloves	4 "
Oil of Caraway	4 "
Saccharin	4 milligrammes.

Mix to form a clear solution.

Soap Dentifrice. (*Pharm. Journ.*, from *Pharm. Era*, xvii. 600.)

Thymol	25 parts.
Extract of Rhatany	100 "
Glycerin (warm)	600 "
Calcined Magnesia	50 "
Borax	500 "
Oil of Peppermint	100 "
Medicinal Soap to produce	9000 "

Mix the thymol and the extract with the warm glycerin and add the other ingredients.

Superior Tooth Paste. (From *Bull. Pharm.*)

Powdered Orris Root	1200 parts.
Powdered Myrrh	30
Powdered Pumice Stone	30
Precipitated Chalk	240
Oil of Cloves	3·75
Oil of Lemon	3·75
Oil of Rose	0·75 part.
Honey } of each	q.s.
Glycerin }	
Solution of Carmine	q.s.

Formalin Tooth Paste. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxvi. 9.) 30 grammes of 40 per cent. solution of formaldehyde are intimately mixed with 1,000 grammes of precipitated chalk and subsequently with 200 grammes of powdered orris root, 50 grammes of magnesium carbonate, 100 grammes of powdered soap, 10 grammes of oil of peppermint, 2 of oil of bergamot, 1 gramme of oil of lemon, and 700 grammes of pure glycerin.

Formalin Mouth-Wash. (*Zeitschr. des oesterr. Apoth. Ver.*, xxxvi. 9.) Canz recommends the following:—

Formaldehyde (40 per cent.)	50 grammes.
Rectified Spirit	1000 "
Tincture of Benzoin	200 "
Tincture of Myrrh	50 "
Oil of Peppermint	3 "
Oil of Anise	2 "
Oil of Cassia	1 gramme.
Oil of Cinnamon	15 drops.
Powdered Cochineal	2 grammes.

Aromatic Toilet Vinegar. (*Merck's Report and Chemist and Druggist.*)

Rectified Spirit	6 oz.
Oil of Bergamot	25 min.
Oil of Lemon	25
Oil of Orange	10
Oil of Rosemary	20
Oil of Lavender	3
Oil of Melissa	5
Aqueous decoction of 1 dr. each of Ben- zoin, Tolu, Styraç, and Cloves . .	12 oz.
Vinegar	4 „
Acetic Acid	1 dr.

Macerate for a week and filter.

Resorcin Hair Tonic. (*From Pharm. Journ.*)

Salicylic Acid	15 gr.
Resorcin	3ss.
Tinct. Cantharidis	3ss.
Tinct. Capsici	3i.
Saponin	3i.
Lanolin	3i.
Aqua Rosa ad	3x.

Melt the lanolin; dissolve the saponin in one ounce of water, and mix with the lanolin. Dissolve the other ingredients in the spirit and rose water; then mix.

Superior Hair-Restorer. (*Chemist and Druggist*, lii. 772.)

Tincture of Cantharides	$\frac{1}{2}$ oz.
Tincture of Cinchona	1 „
Glycerin	$\frac{1}{2}$ „
Rectified Spirit	5 „
Oil of Cologne	$\frac{1}{2}$ „
Water to make	16 „

Allow to stand over-night and then filter through paper.

Harmless Hair-Dye. (*From Pharm. Zeitung.*) The hair is well washed in the morning with any alkaline hair-wash, and the following solution applied by means of a hair brush in the evening:—

Pyrogallic Acid	4 grammes.
Citric Acid	0.8 gramme.
Boroglycerin	10 grammes.
Distilled Water	90 „

Nalolia Pomade. (*Chemist and Druggist*, lii. 23.)

Lanolin	10 oz.
White Vaseline	10 "
French Rose Pomade	5 "
French Violet Pomade	5 "
Pyrogallic Acid	1 "
Oil of Bergamot	1 "

Melt and mix well together in a water-bath.

Formulæ for Perfumes. (From *Pharm. Post.*)*Linden Blossom.*

Extract of Jonquil	300 grammes.
Jasmine	200 "
Rose	100 "
Tuberose	100 "
Tincture of Orris	100 "
Tincture of Ambergris	100 "
Tincture of Tonka	50 "
Tincture of Civet	20 "
Tincture of Musk	10 "
Oil of Wintergreen	1 gramme.
Genuine Bitter Almond Oil	$\frac{1}{2}$ "

Tea Rose.

Extract of Rose	8000 grammes.
Jonquil	1000 "
Tincture of Tonka	200 "
Tincture of Vanilla	500 "
Tincture of Civet	10 "
Tincture of Musk	20 "
Oil of Bergamot	70 "
Extract White Rose	500 "
Extract Ylang-ylang	500 "

Ixora.

Extract of Rose	2000 grammes.
Orange	800 "
Tincture of Benzoin	300 "
Tincture of Tonka	100 "
Tincture of Musk	200 "
Tincture of Ambrette	50 "
Tincture of Orris	500 "
Tincture of Vanilla	500 "
Oil of Rose	20 "
Oil of Patchouli	5 "
Rose Geranium	15 "

Geranium.

Extract of Rose	1000 grammes.
Orange	500 "
Jasmine	200 "
Tincture of Orris	200 "
Tincture of Musk	2 "
Oil of Rose Geranium	50 "

Edelweiss.

Extract of Rose	4 kilos.
Orange	1 kilo.
Tuberose	1 "
Tincture of Vetiver	3 kilos.
Tincture of Tonka	2 "
Tincture of Ambrette	1 kilo.
Tincture of Musk	400 grammes.
Oil of Rose	10 "
Vetiver Oil	5 "

Queen of the Night.

Extract of Jasmine	2 kilos.
Orange	$\frac{1}{2}$ kilo.
Jonquil	$1\frac{1}{2}$ "
Tincture of Tonka	5 kilos.
Tincture of Orris	2 "
Tincture of Musk	500 grammes.
Tincture of Vanilla	500 "
Tincture of Civet	100 "
Oil of Cloves	50 "

White Clover.

Vanillin	20 grains.
Heliotropin.	20 "
Coumarin	20 "
Tincture of Storax	$\frac{1}{2}$ ounce.
Tincture of Civet	$\frac{1}{2}$ "
Tincture of Orris	1 "
Otto of Rose	60 minims.
Oil of Bergamot	60 "
Oil of Neroli	90 "
Extract of Tuberose	4 ounces.
Extract of Jasmine	8 "
Oil of Cloves	5 minims.
Oil of Bitter Almonds	5 "
Terpineol	60 "
Rectified Spirit	8 fluid ounces.
Glycerin	1 fluid drachm.

Crab Apple.

Hyacinthin	5 minims.
Cratægin	10 grains.
Oil of Ylang-ylang	30 minims.
Volatile Oil of Nutmeg	10 "
Oil of Lignaloës	20 "
Oil of Wintergreen	2 "
Musc. Baur.	10 grains.
Extract of Cassia	2 fluid ounces.
Extract of Violet	4 "
Tincture of Orris	1 fluid ounce.
Glycerin	30 minims.
Extract of Jasmine	4 fluid ounces.

White Iris.

Ionone	3 minims.
Oil of Orris	10 "
Heliotropin	30 grains.
Terpineol	60 minims.
Oil of Ylang-ylang	20 "
Oil of Lignaloës	5 "
Solution of Amyl Acetate, 10 per cent., 5	"
Glycerin	20 "
Essence of Jasmine, to make	10 fluid ounces.

White Violet.

Ionone	60 minims.
Musc. Baur.	10 grains.
Essential Oil of Orris	10 minims.
Extract of Violet	18 fluid ounces.
Extract of Rose	2 "
Oil of Sweet Orange	5 minims.
Oil of Neroli	5 "
Tincture of Orris	4 fluid ounces.
Heliotropin	30 grains.
Terpineol	5 minims.
Solution of Oil of Patchouli (1 in 10)	20 "
Glycerin [.	30 "

Wallflower.

Essential Oil of Orris	2 minims.
Oil of Sweet Orange	1 minim.
Heliotropin	5 grains.
Oil of Neroli	2 minims.
Extract of Orange	2 fluid ounces.
Extract of Tuberose	2½ "
Extract of Jasmine	15 "
Coumarin	8 grains.
Glycerin	30 minims.
Oil of Bitter Almonds	5 "

White Lilac.

Terpineol	3 drachms.
Heliotropin	30 grains.
Extract of Rose	2 fluid ounces.
Oil of Ylang-ylang	10 minims.
Extract of Jasmine	4 fluid ounces.
Rectified Spirit to produce	20 "

Narcissus.

Caryophyllin	10 minims.
Extract of Tuberose	16 fluid ounces.
Extract of Jasmine	4 "
Oil of Neroli	20 minims.
Oil of Ylang-ylang	20 "
Oil of Cloves	5 "
Glycerin	30 "
Solution of Amyl Acetate, 10 per cent.	20 "

Formulæ for Hair Oils. (*Pharm. Zeitung*, xlii. 515.)*Orange Blossom.*

Olive Oil	450 parts.
Oil of Sweet Almonds	50 "
Oil of Lemon	15 "
Oil of Bergamot	7·5 "
Oil of Neroli	1 part.
Crystalline Nerolin	0·1 "

Rose.

Olive Oil	450 parts.
Castor Oil	50 "
Oil of Palmarosa	15 "
African Oil of Geranium	15 "
Oil of Cloves	8 "
Otto of Rose	0·15 part.

Ylang-ylang.

Olive Oil	450 parts.
Oil of Sweet Almonds or Castor Oil	50 "
Oil of Lignaloës	10 "
Oil of Cananga	7·5 "
African Oil of Geranium	4 "
Ylang-ylang	8 "
Oil of Wintergreen	0·5 part.
Oil of Nutmeg	0·2 "

Heliotrope.

Olive Oil	450 parts.
Oil of Sweet Almonds	50 "
Oil of Cloves	15 "
Oil of Lignaloës	6 "
Oil of Bergamot	5 "
Oil of Cedar Wood	2 "
Heliotropin	1 part.
Vanillin	0.4 "

Violet.

Olive Oil	450 parts.
Oil of Sweet Almonds	50 "
Oil of Orris	10 "
Oil of Bergamot	7.5 "
Oil of Lavender	6 "
Oil of Cedar Wood	5 "
Oil of Sandal Wood	4 "
Oil of Wintergreen	1 part.

Macassar.

Olive Oil	400 parts.
Oil of Bergamot	4 "
Oil of Bitter Almonds	1.5 "
African Oil of Geranium	2 "

Violet Water. (*Merck's Report and Chemist and Druggist.*)

Ionone	90 drops.
Distilled Water	5 oz.
Orange Flower Water	1 "
Rose Water	1 "
Rectified Spirit	8 "

Add the ionone to the alcohol and add the waters. Allow to stand and filter.

Permanent Flour-Paste. J. K. Williams. (*Chemist and Druggist*, lii. 772.) Take of wheat-flour 8 oz.; alum, borax, of each 3j.; boric acid, oil of sassafras, of each, 3ss. Mix in an enamelled-iron pan. Add all at once cold water 8 oz., and whip out all lumps; then add acetic acid 2 oz., and boiling water, all at once, 16 oz. Place over a fire and heat to break the starch globules, indicated by the appearance of a bluish tint and great adhesiveness, stirring constantly to prevent burning. Transfer to a covered jar, and when wanted reduce this with boiling water, about 1 part of paste to 2 of boiling water, adding the water slowly.

Lacquer for Glass, China, or Tinware. (*Pharm. Journ.*, 4th series, v. 142, from *Pharm. Zeitung*.) Zinc oxydat., 150; ol. tereb.,

q.s.; dammar varnish, 90; ol. lini fervid.; bals. copaib., āā 20; ol. ricini, 5; plumb. acet. subt. plv., 3. For painting tinware. To be applied as thinly as possible; two to three coats are necessary. For painting inscriptions, lampblack and resin mixed with a few drops of pure alcohol on a glass plate should be used. For red lettering cinnabar should be used instead of lampblack. For direct inscription on glass, china, or tin, use the following lacquer:—Lampblack, 5·0; dammar varnish, 15; ol. lini fervid.; bals. copaib., āā 10; ol. ricini, 2·0; plumb. acet. or siccitav., 3–4.

Grease-proof Paper. (*Pharm. Era*, xvii. 323.) Zimmermann states that parchment paper drawn through a 2 or 3 per cent. solution of pyroxylin in ether-alcohol or other solvent is rendered quite grease proof. The film formed upon evaporation is firmly united to this kind of paper, while water detaches it from ordinary paper. If the parchment paper be treated first with a 3 to 5 per cent. solution of cuprammonium, success is assured, though the paper may be very stout and hard.

Polish for Aluminium. (*Pharm. Journ.*, from *Bull. Gén. de Thérap.*) 30 grammes of borax are dissolved in 1,000 grammes of water, and the solution is mixed with a few drops of solution of ammonia.

Romanium. (*Scient. Amer.*, lxxviii. 51.) This name is applied to an alloy of aluminium with nickel and tungsten, containing 95 per cent. of aluminium. It is light and very malleable.

Lubricant for Sounds, Bougies, etc. (*Journ. de Pharm. d'Anvers*, 1898, 260.) The following lubricant is soluble in water, and therefore does not coat the mucous surface with a protecting layer; the greasy lubricants which are generally used prevent proper contact of aqueous injections and other medications, since they are insoluble in water. Powdered soap, 6; glycerin, 100; thymol, 1. Dissolve the soap in the glycerin on the water bath, then add the thymol in powder.

Sticky Fly-Papers. (*Pharm. Centralh.*, xxxviii. 448.) The following proportions are given for preparing these papers:—

Resin	.	.	550	500	650	600	500 grammes.
Linseed Oil	.	.	350	300	—	—	—
Castor Oil	.	.	—	—	350	300	340
Honey	.	.	100	200	—	100	—
Glycerin	.	.	—	—	—	—	160

Melt together and spread on paper while warm. The addition of strong decoctions of pepper or quassia chips or emetic tartar to the honey kills the flies quicker.

Mineral Manures for Pot Plants. M. Thurgan. (*Journ. de Pharm.*, v. 593.) A mixture of 30 parts of potassium nitrate, 25 of potassium phosphate, 10 of ammonium sulphate, and 35 of ammonium nitrate causes a rapid growth. If the main object is to hasten the flowering of the plant, the last-named ingredient should be omitted.

Preservation of Eggs. (*Chemist and Druggist*, lii. 704.) Experiments carried out with the object of ascertaining the best method of preserving eggs gave the following results after 8 months of preservation:—

(1) Eggs placed for preservation in salt water were all bad (not rotten, but uneatable, the salt having penetrated into the eggs). (2) Wrapped in paper, 80 per cent. bad. (3) Preserved in a solution of salicylic acid and glycerin, 80 per cent. bad. (4) Rubbed with salt, 70 per cent. bad. (5) Preserved in bran 70 per cent. bad. (6) Provided with a cover of paraffin, 70 per cent. bad. (7) Varnished with a solution of glycerin and salicylic acid, 70 per cent. bad. (8) Put in boiling water for twelve to fifteen seconds, 50 per cent. bad. (9) Treated with a solution of alum, 50 per cent. bad. (10) Put in a solution of salicylic acid, 50 per cent. bad. (11) Varnished with water-glass, 40 per cent. bad. (12) Varnished with collodion, 40 per cent. bad. (13) Covered with lac, 40 per cent. bad. (14) Varnished with various mixtures, 20 per cent. bad. (15) Preserved in ashes of wood, 20 per cent. bad. (16) Treated with boric acid and water-glass, 20 per cent. bad. (17) Treated with potassium manganate, 20 per cent. bad. (18) Varnished with vaselin, all good. (19) Preserved in lime-water, all good. (20) Preserved in a solution of water-glass, all good. The last three methods are consequently the best ones, the preservation in a solution of water-glass being preferable, as rubbing the eggs with vaselin takes too much time, and the lime-water method occasionally communicated to the eggs a disagreeable odour and taste.

It is, of course, important that only new-laid eggs be used for preservation. As a test for fresh eggs a solution of 120 grammes of salt in 1 litre of water is used. This forms a solution of sp. gr. 1·073, and all eggs which sink in this solution may be used for preservation.

TRANSACTIONS
OF THE
British Pharmaceutical Conference
AT THE
THIRTY-FIFTH ANNUAL MEETING
AT
BELFAST.
1898.

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British Pharmaceutical Conference.

CONSTITUTION.

Art. I.—This Association shall be called The British Pharmaceutical Conference, and its objects shall be the following:—

1. To hold an annual Conference of those engaged in the practice, or interested in the advancement, of Pharmacy, with the view of promoting their friendly reunion, and increasing their facilities for the cultivation of Pharmaceutical Science.
2. To determine what questions in Pharmaceutical Science require investigation, and when practicable, to allot them to individuals or committees to report thereon.
3. To maintain uncompromisingly the principle of purity in Medicine.
4. To form a bond of union amongst the various associations established for the advancement of Pharmacy, by receiving from them delegates to the annual Conference.

Art. II.—Membership in the Conference shall not be considered as conferring any guarantee of professional competency.

RULES.

1. Any person desiring to become a member of the Conference shall be nominated in writing by a member, and be balloted for at a general meeting of the members, two-thirds of the votes given being needful for his election. If the application be made during the recess, the Executive Committee may elect the candidate by a unanimous vote.

2. The subscription shall be 7s. 6d. annually, which shall be due in advance upon July 1.

3. Any member whose subscription shall be more than two years in arrear, after written application, shall be liable to be removed from the list by the Executive Committee. Members may be expelled for improper conduct by a majority of three-fourths of those voting at a general meeting, provided that fourteen days' notice of such intention of expulsion has been sent by the Secretaries to each member of the Conference.

4. Every association established for the advancement of Pharmacy shall, during its recognition by the Conference, be entitled to send delegates to the annual meeting.

5. The Officers of the Conference shall be a President, four Vice-presidents by election, the past Presidents (who shall be Vice-presidents), a Treasurer, two General Secretaries, one local Secretary, and nine other members, who shall collectively constitute the Executive Committee. Three members of the Executive Committee to retire annually by ballot, the remainder being eligible for re-election. They shall be elected at each annual meeting, by ballot of those present.

6. At each Conference it shall be determined at what place and time to hold that of the next year.

7. Two members shall be elected by the Conference to audit the Treasurer's accounts, such audited accounts to be presented annually.

8. The Executive Committee shall present a report of proceedings annually.

9. These rules shall not be altered except at an annual meeting of the members.

10. Reports on subjects entrusted to individuals or committees for investigation shall be presented to a future meeting of the Conference, whose property they shall become. All reports shall be presented to the Executive Committee at least fourteen days before the annual meeting.

* * * Authors are specially requested to send the titles of their Papers to The Hon. Gen. Secs. Brit. Pharm. Conf., 17, Bloomsbury Square, London, W.C., two or three weeks before the Annual Meeting. The subjects will then be extensively advertised, and thus full interest will be secured.

FORM OF NOMINATION.

I Nominate

(Name).....

(Address).....

as a Member of the British Pharmaceutical Conference.

Member.

Date.....

This or any similar form must be filled up legibly, and forwarded to The Asst. Secretary, Brit. Pharm. Conf., 17, Bloomsbury Square, London, W.C., who will obtain the necessary signature to the paper.

Pupils and Assistants, as well as Principals, are invited to become members.

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 Tollitt, Mr. W., 89, Montague Street, Worthing.
 Tompsett, Mr. Leighton S., 127, Anerley Road, London, S.E.
 Toone, Mr. Arthur H., 8, Rolle Street, Exmouth.
 Toone, Mr. J. A., 50, Old Christchurch Road, Bournemouth.
 Townsend, C., M.P., J.P., 7, Union Street, Bristol.
 Townsend, Mr. Wm., Little Queen Street, Exeter.
 Trigg, Mr. J. W., 31, Lr. Barton Street, Gloucester.
 Troke, Mr. C., 2, Bath Street, City Road, E.C.
 Truman, Mr. H. V., 187, Newington Butts, S.E.
 Tull, Mr. F. C., 135, Peascod Street, Windsor, Berks.

- Tupholm, Mr. F., 1, Coleherne Terrace, West Brompton, S.W.
 Tupman, Mr. H. Wyke, 6, Montague Street, Worthing.
 Turnbull, Mr. H. J., Tavistock Works, Sunderland.
 Turner, Mr. C. E., 20, Bury Street, Great Russell Street, W.C.
 Turner, Mr. J., Chemical Works, Great Yarmouth.
 Turner, Mr. J., 15, Fore Street, Hexham.
 Turner, Mr. J., The Limes, Aylesbury.
 Turner, Mr. W. F., 45, Botolph Street, Norwich.
 Turney, Mr. J. Davy, 183, Union Street, Plymouth.
 Twemlow, Mr. R., 91, Upper Brook Street, Manchester.
 Twiss, Mr. W., Hunstanton, Norfolk.
 Tyrer, Chas., F.C.S., Stirling Chemical Works, Abbey Lane, Stratford, E.
 Tyrer, Thos., F.I.C., F.C.S., Stirling Chemical Works, Abbey Lane, Stratford, E.
 Tyson, Mr. John, Victoria Bridge, Manchester.
 Umney, C., F.I.C., F.C.S., 48 & 50, Southwark Street, S.E.
 Umney, Mr. E. A., 48 & 50, Southwark Street, S.E.
 Umney, John C., F.C.S., 48 & 50, Southwark Street, S.E.
 Unsworth, Mr. J. W., 113, George Street, Altrincham, Manchester.
 Vallance, Mr. A. C., Cavendish House, Mansfield.
 Vincent, Mr. P., 19, Jerdan Place, Fulham, S.W.
 Voce, Mr. W. G., 52, Halesowen Road, Netherton, near Dudley.
 Vogt, Mr. Geo., 30, Highgate, Kendal.
 Wakeham, Mr. C., Helston, Cornwall.
 Walker, Mr. C., 8, Cannon Street Road, E.
 Walker, Mr. Frank, 12, Beacon Lane, Everton, Liverpool.
 Walker, Mr. J., Grange Road, West Kirby.
 Walker, Mr. James D., 1, Lynedoch Place, Edinburgh.
 Walker, Mr. John, 32, Virginia Street, Glasgow.
 Walker, J. F., M.A., F.I.C., F.C.S., 45, Bootham, York.
 Walmsley, Mr. M., Phoenix Mills, Dartford, Kent.
 Walsh, Dr. J. A., 30, Westmorland Street, Dublin.
 Walton, Mr. R., 73, High Street, Maidenhead.
 Wand, Mr. S., 18, Haymarket, Leicester.
 Want, Mr. W. P., 42, Bishopsgate Street Without, E.C.
 Ward, G., F.I.C., F.C.S., Millgarth Mills, Leeds.
 Ward, Mr. J., 39, Eastgate Street, Gloucester.
 Ward, Mr. J. S., 101, Whitecross Street, E.C.
 Ward, W., F.C.S., Sheffield Moor, Sheffield.
 Wardleworth, Mr. Theo. H., 56, Hanover Street, Liverpool.
 Waring, Mr. A. W., 3, Bucklersbury, E.C.
 Warren, Mr. W., 24, Russell Street, Covent Garden, W.C.
 Warrick, Mr. F. W., 7, Portpool Lane, E.C.
 Waterall, Mr. G. E., 2, Chapel Bar, Nottingham.
 Wathes, Mr. A., 6, Holloway Head, Birmingham.
 Watkinson, Mr. J. W., 43, Higher Market Street, Farnworth, Bolton.
 Watson, Mr. A. J., 41, Mill Lane, West Hampstead, N.W.
 Watson, Mr. David, 558, Cathcart Road, Govanhill, Glasgow.
 Watson, F. P., F.C.S., 6, Bailgate, Lincoln.
 Watson, Mr. J. E. H., Rose Corner, Norwich.
 Watson, Mr. John, Rosemount, Knock, Belfast.
 Watson, T. D., F.C.S., 16, St. Mary's Road, Bayswater, W.
 Watt, Mr. Geo. A., 20, Lynn Street, West Hartlepool.
 Watts, Mr. J., 365, Tong Street, Dudley Hill, Bradford, Yorks.
 Weaver, Mr. A. C., 42, Dudley Road, Wolverhampton.
 Webb, Mr. Chas. S., 87, North Side, Clapham Common, S.W.

- Webb, Mr. E. A., 60, Bartholomew Close, E.C.
 Webb, Mr. J. H., Rowsley House, Cardiff Road, Luton, Beds.
 Weddell, Mr. George, 20, West Grainger Street, Newcastle-on-Tyne.
 Weld, Mr. C. Corning, Snow Hill Buildings, Holborn Viaduct, E.C.
 Wellburn, Mr. John S., 60, Nightingale Road, Lower Clapton, E.
 Wellcome, Mr. H. S., Snow Hill Buildings, Holborn Viaduct, E.C.
 Wellings, Mr. Wm., 56, Hanover Street, Liverpool.
 Wells, Mr. W. F., junr., 20, Upper Baggot Street, Dublin.
 West, Mr. G. W., Market Place, Stokesley, R.S.O.
 West, Mr. T., 1187, Chester Road, Stretford, Manchester.
 Weston, Mr. S. J., 151, Westbourne Terrace, W.
 Whigham, Mr. R. L., 22, Brook Street, Bond Street, W.
 White, Mr. Arthur F., 61, Sunbridge Road, Bradford, Yorks.
 White, E., B.Sc., F.I.C., St. Thomas's Hospital, London, S.W.
 White, Mr. G., 55, High Street, Dudley.
 White, Mr. J. F., 13, Blenheim Terrace, Leeds.
 Whitfield, J., F.C.S., 113, Westborough, Scarborough.
 Whittle, Mr. J., Bridge Street, Morpeth.
 Whysall, Mr. W., Grantham.
 Whyte, Mr. J. S., 57, Guthrie Port, Arbroath, N.B.
 Wiggins, Mr. H., 236, Southwark Park Road, S.E.
 Wild, Mr. John, 307, Oxford Street, Manchester.
 Wilford, Mr. J., 52, Milton Street, Nottingham.
 Wilkinson, Mr. B. J., 7, Middleton Road, Kingsland, N.E.
 Wilkinson, Mr. G., 267, Waterloo Road, Manchester.
 Wilkinson, Mr. W., 28, Bury Old Road, Cheetham Hill, Manchester.
 Will, W. Watson, F.C.S., 1, St. Agnes Place, Kennington Park, S.E.
 Willan, Mr. R., 5, Market Street, Ulverston.
 Williams, Mr. E., Cerrig-y-Druidion, Denbighshire.
 Williams, Mr. E., 10, Wrexham Street, Mold.
 Williams, Mr. J. H., 35, Commercial Road, Bournemouth.
 Williams, Mr. W. G., 8, Castle Street, Conway.
 Williams, Mr. W. Jesse, Park Hall Buildings, Queen Street, Cardiff.
 Williams, W. Lloyd, F.I.C., F.C.S., Phoenix Mills, Dartford, Kent.
 Williamson, Mr. L., 21, Newgate Street, Newcastle-on-Tyne.
 Williamson, Mr. W. H., 72, Elizabeth Street, Cheetham, Manchester.
 Wills, Mr. G. S. V., Westminster College, Trinity Square, Boro', S.E.
 Wilson, Mr. A., Phoenix Mills, Dartford, Kent.
 Wilson, Mr. Harold, University College Hospital, Gower Street, W.C.
 Wilson, Mr. J., 11, George Street, Bath.
 Wilson, Mr. J. B., 118, High Street, Oxford.
 Wilson, Mr. J. H., The Knowle Valley Road, Harrogate.
 Wilson, Mr. T., Stowmarket, Suffolk.
 Wing, Mr. G. N., 29, Market Place, Melton Mowbray.
 Wink, Mr. J. A., 2, Devonshire Square, Bishopsgate Street, E.C.
 Wokes, Mr. T. S., Grassendale, near Liverpool.
 Wood, Mr. A., New Brentford, Middlesex.
 Wood, Mr. Wm., Phoenix Mills, Dartford, Kent.
 Woolcombe, R. L., LL.D., F.I.Inst., F.S.S., M.R.I.A., 14, Waterloo Road, Dublin.
 Woolley, Mr. E. J., Victoria Bridge, Manchester.
 Woolley, Mr. S. W., 91, Southwood Lane, Highgate, N.
 Woolley, Mr. G. J. B., London Road, Leicester.
 Woolley, Mr. G. S., Victoria Bridge, Manchester.
 Woolley, Mr. Hermann, Victoria Bridge, Manchester.
 Woollons, Mr. C. H. F., 28, Kilburn Lane, W.
 Woolrich, Mr. C. B., Uttoxeter, Staffs.
 Wootton, Mr. A. C., 42, Cannon Street, E.C.
 Worfolk, Mr. G. W., 16, Brook Street, Ilkley.
 Worrall, J. H., F.I.C., F.C.S., Howsley, Chapeltown, nr. Sheffield.

Worsley, Mr. A. G., 135, Ladbroke Grove, W.
 Wrenn, W. A., F.C.S., 15, East Street, Taunton.
 Wright, A., A.K.C., 13, High Street, Yeovil, Somerset.
 Wright, Mr. G., 102, High Street, Burton-on-Trent.
 Wright, Mr. H. C., 48 & 50, Southwark Street, S.E.
 Wright, R., F.C.S., 11, Eagle Parade, Buxton, Derbyshire.
 Wyatt, Mr. H., 223, Stanley Road, Bootle, Liverpool.
 Wyborn, J. M., F.C.S., 59, Moorgate Street, E.C.
 Wyley, Mr. W. F., Wheatley Street, Coventry.
 Wyman, Mr. J. S., 58, Bunhill Row, E.C.
 Wynne, Mr. E. P., 7, Pier Street, Aberystwith.

Yates, Mr. C. G., 21, Upper Hamilton Road, Brighton.
 Yates, Mr. D., 32, Darwen Street, Blackburn.
 Yates, Mr. E., Swinton, near Manchester.
 Yates, Mr. F., 101, Southwark Street, S.E.
 Yates, Mr. R., 101, Southwark Street, S.E.
 Young, Mr. J., 20, High Street, Newport, Mon.

Young, J. Rymer, F.C.S., 42, Sankey Street, Warrington.
 Young, Mr. J. R., 35, Chalmers Street, Lauriston, Edinburgh.
 Young, Mr. J. R., junr., 17, North Bridge, Edinburgh.
 Young, Mr. R. F., New Barnet.

NOTICE.

Members are requested to report any inaccuracies in these lists by letter, addressed as follows :—

THE ASST. SECRETARY,

BRIT. PHARM. CONF.,

17, Bloomsbury Square,

London, W.C.

SOCIETIES AND ASSOCIATIONS

INVITED TO SEND DELEGATES TO THE ANNUAL MEETING.

The Pharmaceutical Society of Great Britain.
The North British Branch of the Pharmaceutical Society of Great Britain.
The Pharmaceutical Society of Ireland.

ABERDEEN AND NORTH OF SCOTLAND.—Society of Chemists and Druggists (1839).
Mr. John Cruickshank, 42, George Street, Aberdeen.

BIRMINGHAM.—Midland Pharmaceutical Association. Mr. C. F. Jarvis, Villa Road, Handsworth, Birmingham.

BOURNEMOUTH.—Chemists' Association. Mr. Stewart Hardwick, 21, Commercial Road, Bournemouth.

BRIGHTON.—Association of Pharmacy (1861). Mr. W. W. Savage, 109, St. James's Street, Brighton.

BRISTOL.—Pharmaceutical Association (re-established 1869). Mr. B. Keen, 90, Park Street, Bristol.

CAMBRIDGE.—Pharmaceutical Association. Mr. B. S. Campkin, Mill Road, Cambridge.

COLCHESTER.—Association of Chemists and Druggists (1845). Mr. Edes Everett, St. Botolph Pharmacy, Colchester.

DOVER.—Chemists' Association. Mr. R. M. Ewell, 37, Town Wall Street, Dover.

DUNDEE.—Chemists and Druggists' Association (1868). Mr. J. Russell, 111, Nethergate, Dundee.

EDINBURGH.—Chemists' Assistants' and Apprentices' Association. Mr. G. H. C. Rowland, 117, Princes Street, Edinburgh.

GLASGOW AND WEST OF SCOTLAND.—Pharmaceutical Association. Mr. D. Watson, 558, Cathcart Road.

HASTINGS.—Chemists' Association (1884). Mr. A. N. Beck, 2, Cambridge Gardens, Hastings.

HULL.—Chemists' Association (1868). Mr. C. B. Bell, 6, Spring Bank, Hull.

LEEDS.—Chemists' Association (1862). Mr. W. D. Pollitt, Church Institute, or 106, Woodhouse Lane, Leeds.

LIVERPOOL.—Chemists' Association (1849). Messrs. Theo. H. Wardleworth, 56, Hanover Street, and Hugh O. Dutton, Rockferry, Liverpool.

LONDON.—Chemists' Assistants' Association. Messrs. G. E. Pearson and F. W. Gamble, 73, Newman Street, W.

MANCHESTER.—Pharmaceutical Association. Mr. A. Blackburn, 7, Exchange Street.

NEWCASTLE-ON-TYNE.—Newcastle-on-Tyne and District Chemists' Association.
Mr. Geo. F. Mirson, 24, Newgate Street.

NOTTINGHAM.—Nottingham and Notts Chemists' Association (1863). Mr. A. Eberlin, 2, Chapel Bar, Nottingham.

OLDHAM.—Chemists' and Druggists' Assistants and Apprentices' Association (1870). Mr. C. G. Wood, Secretary, Church Institute, Oldham.

PLYMOUTH, DEVONPORT, STONEHOUSE AND DISTRICT.—Chemists' Association.
Mr. C. J. Weary, 1, Alfred Street, Plymouth.

SHEFFIELD.—Pharmaceutical and Chemical Society (1869). Mr. J. B. Pater, 1, Broomhill, Sheffield.

SUNDERLAND.—Chemists' Association (1869). Mr. R. H. Bell, 27, Thornton Place, Sunderland.

PRESENTATION COPIES OF THE YEAR-BOOK OF PHARMACY ARE
FORWARDED TO THE FOLLOWING :—

The Honorary Members.

Libraries.

American Pharmaceutical Association; British Medical Association; Chemical Society of London; Ecole Supérieure de Pharmacie, Montpellier; Ecole Supérieure de Pharmacie, Paris; Massachusetts College of Pharmacy; The Mason College, Birmingham; Missouri College of Pharmacy; New Zealand Board of Pharmacy; North British Branch of the Pharmaceutical Society; Pharmaceutical Society of Great Britain; Pharmaceutical Society of Ireland; Pharmaceutical Society of New South Wales; Ontario College of Pharmacy, Toronto; Pharmaceutical Society of Australasia; Pharmaceutical Society of Queensland; Royal Society of London; Société de Pharmacie, Paris; State of Illinois Board of Pharmacy; Yorkshire College of Science.

Provincial Associations (having Libraries).

Aberdeen Society of Chemists and Druggists; Brighton Chemists' Association; Bristol Pharmaceutical Association; Colchester Association of Chemists and Druggists; Dover Chemists' Association; Dundee Chemists and Druggists' Association; Edinburgh Chemists' Assistants' Association; Glasgow and West of Scotland Pharmaceutical Association; Hastings Chemists' Association; Hull Chemists' Association; Leeds Chemists' Association; Liverpool Chemists' Association; London Chemists' Assistants' Association; Manchester Chemists and Druggists' Association; Midland Pharmaceutical Association; Nottingham and Notts Chemists' Association; Oldham Chemists and Druggists' Assistants and Apprentices' Association; Sheffield Pharmaceutical and Chemical Association; Sunderland Chemists' Association.

Journals.

American Druggist; American Journal of Pharmacy; Archiv der Pharmacie; British and Colonial Druggist; British Medical Journal; Canadian Pharmaceutical Journal; Chemical News; Chemist and Druggist; Journal de Pharmacie et de Chimie; Lancet; Medical Press and Circular; The National Druggist; Pharmaceutical Journal; Pharmaceutische Centralhalle; Répertoire de Pharmacie.

THE FOLLOWING JOURNALS ARE RECEIVED FROM THEIR RESPECTIVE EDITORS :—

American Druggist; Archiv der Pharmacie; Australasian Journal of Pharmacy; British and Colonial Druggist; British Medical Journal; Canadian Pharmaceutical Journal; Chemical News; Chemist and Druggist; Journal de Pharmacie et de Chimie; National Druggist; Pharmaceutical Journal; Pharmaceutical Record; Pharmaceutische Centralhalle; Proceedings of the American Pharmaceutical Association; Répertoire de Pharmacie.

PROGRAMME OF THE PROCEEDINGS

OF THE

BRITISH PHARMACEUTICAL CONFERENCE

AT THE

THIRTY-FIFTH ANNUAL MEETING, BELFAST, 1898.

OFFICERS.

President. CHARLES SYMES, Ph.D., Liverpool.

Vice-Presidents.

(Who have filled the office of President.)

THOMAS, B. GROVES, F.C.S., Weymouth.
R. REYNOLDS, F.C.S., F.I.C., Leeds.
PROF. ATTFIELD, Ph.D., F.R.S., F.I.C.,
F.C.S., London.
T. GREENISH, F.C.S., F.R.M.S., London.
S. R. ATKINS, J.P., Salisbury.
F. B. BENDER, F.I.C., F.C.S., Manchester.

C. UMNEY, F.I.C., F.C.S., London.
W. MARTINDALE, F.C.S., F.L.S., London.
E. C. C. STANFORD, F.I.C., F.C.S., Dalmuir.
OCTAVIUS CORDER, Norwich.
N. H. MARTIN, F.L.S., F.R.M.S., New-
castle-on-Tyne.

Vice-Presidents.

WALTER HILLS, F.C.S. London.
J. LAIDLAW EWING, Edinburgh.

J. C. C. PAYNE, J.P., Belfast.
W. F. WELLS, Dublin.

Treasurer. JOHN MOSS, F.I.C., F.C.S., London.

Honorary General Secretaries.

W. A. H. NAYLOR, F.I.C., F.C.S., London.

F. RANSOM, F.C.S., Hitchin.

Hon. Local Secretary. R. W. MCKNIGHT, Belfast.

Other Members of the Executive Committee.

BIRD, F. C. J., London.
COLLIER, H., London.
FAIR, E. H., Uckfield.
GILDER, JAMES, Belfast.

GREENISH, Prof., London.
UMNEY, J. C., F.C.S., London.
RUSSELL, J. ANDERSON, Glasgow.
WHITE, EDMUND, B.Sc., London.

WRIGHT, R., F.C.S., Buxton.

Auditors.

W. L. CURRIE, Glasgow, and D. W. ELLIOTT, Belfast.

Assistant Secretary.

J. C. NIGHTINGALE.

Editor of Year-Book.

LOUIS SIEBOLD, F.I.C., F.C.S.

Local Committee.

ALEX, JAS., Lisburn.
ANDERSON, R., Belfast.
ANDERSON, J., Lisburn.
BACKHOUSE, H., Dundalk.
BAXTER, JOHN, Ballymoney.
BAXTER, W. J., Coleraine.
BLACK, JOHN, Lurgan.
BOGGS, J. G. W., Fortrush.
BONNAR, S., Ballymena.
BOYD, D., Belfast.
CAMBRIDGE, K., Carrickfergus.
CLOTWORTHY, S., Belfast.
COCHRANE, Alderman, Bel-
fast.
CONNIFGHAN, Mr., Dublin.
CONNOR, J. E., Newry.
DODD, W., Belfast.
EDMOND, T. H., Newry.
ELLIOTT, D. W., Belfast.
FIELDER, Dr., Belfast.
FRACKLTON, JOHN, Belfast.
GIBSON, A., Belfast.

GIBSON, W. J., Belfast.
GIBSON, SAMUEL, (Hon. Local
Treasurer), Belfast.
GREEN, THOMAS, Belfast.
GUILER, J., Belfast.
HANNA, W., Bangor.
HANLETT, SIR J. H., M.P.,
Belfast.
HANLETT, J. H., jun., Belfast.
HAY, J. B., Belfast.
HAYES, W., Dublin.
HOOG, A. R., Belfast.
HOOG, JAMES, Belfast.
JAMISON, W., Belfast.
JONES, Mr., Warrenpoint.
LANCASTERS, H., Ballymena.
LEITCH, Mr., Belfast.
LYNDS, W., Belfast.
LYONS, F. J., Belfast.
LYTLE, W., Belfast.
MADDEN, W. H., Belfast.

MURPHY, A., Athlone.
MURPHY, J., Newry.
MCKNIGHT, R. W. (Hon. Sec.),
Belfast.
M'ADAM, J. C., Omagh.
M'DOWELL, S., Belfast.
M'CLEMENTS, J., Belfast.
MCKINNEY, Dr. D. J., Belfast.
M'CULLAN, THOMAS, Belfast.
MOFFATT, T. N., Belfast.
MONTGOMERY, J., Belfast.
MORROW, R., Belfast.
NICHOLL, J., Belfast.
NICHOLL, S. C., Belfast.
O'SHEA, Mr., Belfast.
PAYNE, J. C. C., J. P., Belfast.
PRING, W., Belfast.
RANKIN, W. J. (Hon. Sec.),
Belfast.
REDPATH, W., Ballymoney.
REID, S. M., Belfast.

REYNOLDS, EDWARD, Belfast.
RICHARDSON, JAMES, Belfast.
RITTON, R., Belfast.
ROBINSON, J. B., Belfast.
ROBINSON, Mr., Kingstown.
SHANKS, J. B., Holywood.
SHAW, J. H., Belfast.
SHAW, Wm., Belfast.
SPENCE, R., Castleblaney.
STEWART, J. A., Belfast.
SUFFERN, S., Belfast.
TATE, JAS., Belfast.
THOMPSON, J., Belfast.
TWEEDIE, Dr., Belfast.
WATSON, J., Belfast.
WHITE, T., Bray.
WHITE, W., Belfast.
WHITLA, Prof., M.D., Belfast.
WHITLA, M.R., M.D., Monag-
han.
YOKALL, H., Belfast.

THE SITTINGS OF THE CONFERENCE WERE HELD IN THE

QUEEN'S COLLEGE, BELFAST,

ON TUESDAY & WEDNESDAY, AUGUST 9TH AND 10TH, 1898,

Commencing at Ten a.m. each day.

MONDAY, 8th AUGUST.

The EXECUTIVE COMMITTEE met, according to notice from the Honorary General Secretaries, at 9 p.m., at the Grand Central Hotel Belfast.

TUESDAY, 9th AUGUST.

The CONFERENCE met at 10 a.m., adjourning at 1 p.m.; and at 2 p.m. adjourning at 4 p.m.

Order of Business.

Address of Welcome by the Right Hon. the Lord Mayor and Dr. Hamilton
President of the Queen's College.

President's Address.

Reception of Delegates.

Report of the Executive Committee.

Financial Statement.

Report of the Treasurer of the "Bell and Hills Library Fund."

Report of the Unofficial Formulary Committee by W. Martindale, F.L.S.,
F.C.S.

Reading of Papers and Discussions thereon.

PAPERS.

1. *Kieselguhr*. By JOHN MOSS, F.I.C., F.C.S.
2. *Note on Eucalyptus Oil*. By E. J. PARRY, B.Sc., F.I.C., F.C.S.
3. *Gluten Flour and its Analysis*. By VICTOR G. L. FIELDEN, M.B.
4. *Thyroglandin*. By E. C. CORTIS STANFORD, F.I.C., F.C.S.
5. *A Quick Polarimetric Method for the Estimation of Strophanthin in the B.P. Tincture and Extract*. By EDWIN DOWZARD, F.C.S.
6. *Green Extracts of the Pharmacopoeia*. By W. A. H. NAYLOR, F.I.C., F.C.S. and JOHN J. BRYANT.
7. *Iron and other Alginoids*. By E. C. CORTIS STANFORD, J.P., F.I.C., F.C.S.
8. *A New Constituent of Oil of Lemon*. By JOHN C. UMNEY, Ph.C., F.C.S. and R. S. SWINTON.
9. *Notes on Concentrated Oil of Lemon*. By T. H. WILLIAMS IDRIS, J.P., F.C.S.
10. *The Commercial Varieties of Dill and their Essential Oils*. By JOHN C. UMNEY, Ph.C., F.C.S.
11. *The Salient Features of the Irish Flora*. By G. C. DRUCE, M.A., F.L.S.

There was a mid-day adjournment between 1 and 2 p.m. for luncheon at the Queen's College.

After the adjournment of the Conference members and friends enjoyed tea upon the lawn, after which they were taken for a drive to Giant's Ring, Purdysburn and Ormeau Park.

WEDNESDAY, 10th AUGUST.

The CONFERENCE met at 10 a.m., adjourning from 1 till 2 p.m. The whole of the business of the Conference was completed this day at 4.30 p.m.

Order of Business.

Reception of Delegates.

Reading of Papers and Discussions thereon.

PAPERS.

12. *Note on Extract of Ginger.* By T. H. WILLIAMS IDRIS, F.C.S.
13. *Materia Medica Animals* By J. C. McWALTER, L.R.C.S.I., L.A.H.I., M.P.S.I.
14. *Notes on Ferrum Redactum.* By E. SAVILLE PECK, B.A.
15. *The Characters and Methods of Estimation of the Official Hypophosphites.* By H. A. D. JOWETT, D.Sc.
16. *The Basicity of Quinine.* By DAVID HOWARD, F.I.C., F.C.S., and DAVID LLOYD HOWARD, F.C.S.
17. *Note on the Mydriatic Alkaloids.* By H. A. D. JOWETT, D.Sc.
18. *Pharmacists and the Pharmacopœia.* By PETER MACEWAN, Ph.C., F.C.S.
19. *Galenical Pharmacy of the 1898 Pharmacopœia.* By F. C. J. BIRD.
20. *The Galenicals of the Pharmacopœia from a Wholesaler's Point of View.* By H. WIPFELL GADD.
21. *The Chemistry of the Pharmacopœia.* By P. KELLY, Ph.C., M.P.S.I.
22. *The Pharmacopœia Chemically Considered.* By A. L. DORAN, Ph.C., M.P.S.I.
23. *A Short Note on Lime Water.* By E. J. EVANS.
24. *The Amount of Carbonic Anhydride Available in the Official Granular Effervescent Preparations.* By C. S. DYER, A.P.S.
25. *Albumen, and Some Types of Proteid Digestion.* By GORDON SHARPE, M.D., etc.

Presentation from Bell and Hills Fund.

Election of Formulary Committee.

Place of Meeting for 1899.

Election of Officers for 1898-99.

There was a mid-day adjournment between 1 and 2 p.m. for luncheon at the Queen's College.

Upon the termination of the Conference Sittings members and friends proceeded by invitation to a Garden Party in the Botanic Garden Park, kindly given by the Lord Mayor of Belfast and the Lady Mayoress. The function was largely attended and the weather fine throughout.

THURSDAY, 11th AUGUST.

Excursion round the coast to Antrim, *via* Larne, Garron Tower and Glenariffe to Parkmore. See p. 502.

BRITISH PHARMACEUTICAL CONFERENCE.

MEETING AT BELFAST, 1898.

THE Thirty-fifth Annual Meeting of the British Pharmaceutical Conference commenced its sittings on Tuesday, August 9th, in the Library of the Queen's College, Belfast, Charles Symes, Esq., Ph.D., F.L.S., in the chair.

The following members and friends were present during the meeting :—

Aberdeen—Johnston, Geo. ; Johnston, J.

Adelaide, S. A.—Bickford, A.

Arbroath—Farquharson, Miss ; Naysmith, Mr. and Mrs. A.

Ashby de la Zouch—Bullen, E. ; Bullen, G. W.

Auckland, N.Z.—Aickin, R. T. G.

Ballynahinch—Walker, Jas.

Bedlington—Foggan, Mr. and Mrs. G.

Belfast—Acheson, S. ; Boyd, D. ; Clotworthy, Mr. and Mrs. S. ; Elliott, D. W. ; Fielden, Dr. Victor E. L. ; Gibson, S. ; Guiler, J. ; Guiler, Miss ; Hardy, W. J. ; Hay, John ; Jameson, W. ; Macartney, W. ; McKnight, Mr. and Mrs. R. W. ; Moffitt, T. N. ; Nicholl, S. C. ; O'Shea, A. J. ; Payne, J. C. C. ; Rankin, W. J. ; Shaw, J. H. ; Stratton, W. G. ; Tate, Mr. and Mrs. J. ; Tweedie, D. H. ; Watson, J.

Birmingham—Gibbs, R. Darton ; Jarvis, C. F. ; Poole, J. ; Thompson, C.

Blackburn—Holt, Wm.

Blackrock—Grimes, H.

Bootle—Swinton, T. H.

Bournemouth—Bilson, F. E. ; Toone, J. A.

Bradford—Jackson, John, and the Misses Jackson ; Silson, Mr. and Mrs. R. W.

Brighton—Ashton, C. S. ; Savage, W. W. ; Savage, Miss ; Smithson, Mr. and Mrs. J. ; Smithson, Miss ; Weston, S. J. ; Yates, C. G.

Cambridge—Peck, E. Saville.

Campbeltown—Watson, Margaret.

Carrickfergus—Cambridge, R.; Cambridge, Miss E.

Castleblayney—Spence, R.

Clifton—Buxton, Mr. and Mrs. T.

Coleraine—Baxter, W. J.

Dalkey—Beggs, Mr. and Mrs. D. G.

Dalmuir—E. C. Cortis Stanford.

Dartford—Williams, W. Lloyd.

Darwin—Shorrocks, R.

Dublin—Conyngham, Mr. and Mrs. Hy.; Dusewoody, W. J.; Falkner, Dr. M.; Gill, F. J.; Kelly, P.; McWalter, J. C.; O'Connor, H.; Smith, J.; Walsh, Dr. J. A.; Wells, W. F., junr.; White, T.

Dundee—Anderson, A. B.; Ferrier, D. H.; Kerr, C.; Kerr, Miss; Thomson, Wm.

Edinburgh—Burley, Wm.; Coats, J. T.; Dobson, Miss J.; Ewing, J. Laidlaw; Hill, J. Rutherford; Hogg, J.; Jackson, H.; Lunan, Geo.; McLaren, D.; Mitchell, J. D.

Exeter—Gadd, H. Wippell; Luxton, F.

Exmouth—Toone, A. H.

Girvan—McMuralin, T.

Glasgow—Adam, Mr. and Mrs. Thos.; Brodie, R.; Currie, Mr. and Mrs. W. L.; Dunlop, T.; Hume, H.; McAdam, R.; McAdam, Miss C.; McMillan, Mr. and Mrs. John; Riddell, J. H.; Robertson, A. M.; Robertson, Mr. and Mrs. Geo.; Russell, J. Anderson; Wallace, Wm.; Watson, D.; Watson, Miss A.; Watson, Miss M. M.; Wright, J. S.

Guildford—Williamson, A. E.

Hampstead—Sangster, A.

Helensburgh—McMurray, P. B.

Hitchin—Ransom, F.

Huddersfield—Needham, Thos.

Kirriemuir—Ford, J.; Ford, Miss.

Larne—Kerkwood, N.

Leeds—Braunson, Mr. and Mrs. F. W.

Leith—Bowman, J.; McDougall, Rea J.

Lisburn—Allen, J.

Liverpool—Buck, A. S.; Cowley, R. C.; Evans, E., junr.; Hudson, T. H.; McLaughlin, G. M.; Saunders, Mr. and Mrs. W. H.; Symes, Dr. C.; Tirebuch, J.; Wardleworth, Theo. H.

London—Ball, A. W.; Bird, F. C. J.; Bourdas, J.; Bowen, J.

W.; Bremridge, R.; Clarke, Goddard; Collier, H.; Holmes, E. M.; Howard, D. Lloyd; Humphrey, J.; Jowett, Dr. H. A. D.; MacEwan, Mr. and Mrs. P.; Martindale, Wm.; Moss, John; Naylor, W. A. H.; Nightingale, J. C.; Parry, E. J.; Robinson, W. P.; Sangster, A.; Shacklock, J. H.; Umney, John C.; Want, W. P.; Warren, Wm.; Whigham, R. L.; Woolley, S. W.; Wright, Mr. and Mrs. T. R.

Manchester—Johnstone, C. A.; Kemp, H.; Lawton, Mrs. A.; Pidd, A. V.; Siebold, Lewis; Wild, Mr. and Mrs. John.

Mansfield—Vallance, A. C.; Vallance, Miss.

Merthyr Tydvil—Harris, E. W.

Montrose—Davidson, A.

Motherwell—Taylor, Mr. and Mrs. D.

Newcastle-on-Tyne—Clague, T. Maltby; Dickson, J. Scott; Merson, G. F.; Merson, Mrs.; Williamson, L.; Williamson, Miss M.

Newry—Connor, J. E.

New York, U.S.A.—MacMahon, R. A.

Oxford—Druce, G. C.

Paisley—Fraser, A.

Plymouth—Park, C. J.; Turney, J. Davy.

Salisbury—Atkins, S. R.

Settle—Shepherd, J. W.

Shipley—Bayley, Mr. and Mrs. G. H.

St. Andrews—Kermath, Miss M. A.

St. Leonard's-on-Sea—Rossiter, F.

Stockton-on-Tees—Clarke, W. J.

Sunderland—Purse, A. D.

Uckfield—Farr, E. H.

Warrenpoint—Jones, R. A.

Waterloo—Alexander, John.

Wolverhampton—Gibson, F. J.

MEETING OF THE EXECUTIVE COMMITTEE.

A meeting of the Executive Committee was held at the Grand Central Hotel, Belfast, on Monday, August 8th, at 9 p.m.

Present:—Dr. C. Symes (President), in the chair, Messrs. Martindale, Payne, and Wells (Vice-Presidents), Mr. John Moss (Hon. Treasurer), Messrs. Bird, Collier, Farr, Guiler, and J. C. Umney, Mr. McKnight (Hon. Local Secretary), Messrs. Naylor and Ransom (Hon. Gen. Secretaries), and Mr. Nightingale (Assistant Secretary).

Letters of regret were read from members who were unable to be present.

The minutes of the previous meeting were read and confirmed.

Mr. McKnight reported that the Belfast Public Library Committee had consented to place the books presented by the Bell and Hills Fund in the Reference Library, until a Local Association should be formed, to which they would then be handed over.

The Treasurer's Financial Statement for the year ending June 30th, 1898, was read and approved.

A draft report of the Executive Committee was submitted by the Hon. Secretaries and accepted for presentation to the general meeting.

A proposed list of officers for the ensuing year was adopted for recommendation to the general meeting for election.

A programme of the business of the general meeting was submitted and approved.

It was announced that the gift of "Science Papers" by the late Daniel Hanbury, which has been presented with the books provided by the Bell and Hills Fund, would be discontinued. Mr. Martindale kindly offered to present a copy of the last edition of the *Extra Pharmacopœia*.

The Secretaries were requested to send a letter of condolence to the relatives of the late J. E. de Vrij, Ph.D., C.I.E., an honorary member of the Conference.

The place of meeting for 1899 was considered, and it was announced that a cordial invitation from Plymouth would be offered at the general meeting.

The following thirty-four gentlemen having been duly nominated were elected to membership:—

Acheson, S., Belfast.	Haslett, J. H., Belfast.
Backhouse, Hy., Dundalk.	Hogg, John A., Dartford.
Bostock, J., Bath.	Jowett, H. A. D., D.Sc., London.
Braithwaite, J. O., Chingford.	Kent, Chas., Dartford.
Breeze, G., Devonport.	Longman, J. H., Littlehampton.
Brown, J., Dartford.	Maitland, F., Stonehouse.
Connor, J. E., Newry.	Mock, J. G., Cape Town.
Dickson, J. Scott, Newcastle-on-Tyne.	Montgomery, J., Belfast.
Dudderidge, F. R., Newcastle-on-Tyne.	O'Connor, Hy., Dublin.
Fyrl, A., Dublin.	O'Sullivan, Thos., Waterford.
	Poole, J., Birmingham.
	Radcliffe, Guy, Manchester.

Shaw, J. H., Belfast.	Watson, John, Belfast.
Smith, John, Dublin.	Williamson, L., Newcastle-on-Tyne.
Smith, J. L., Salford.	
Smith, J. Stanley, Bombay.	Wilson, A., Dartford.
Turney, J. Davy, Plymouth.	Wilson, H., London.
Varley, F., Wynberg.	Wood, W., Dartford.
Walmsley, M., Dartford.	

GENERAL MEETING.

Tuesday, August 9th.

The thirty-fifth Annual Meeting of the British Pharmaceutical Conference commenced its sittings on Tuesday, August 9th, in the Library of the Queen's College, Belfast, under the presidency of Dr. Charles Symes, of Liverpool. The commodious hall was well filled, a large number of ladies being present.

The proceedings began with an address of welcome by the Lord Mayor of Belfast, who said: Mr. President, ladies, and members of the British Pharmaceutical Conference,—A very pleasing task devolves upon me, and one which I am very pleased to hear from your President may be a short one. The few words I have to utter to you can be nothing else but complimentary, and I can assure you that on this occasion I speak as one who takes an interest in this very excellent Association here as well as in other parts of Ulster; that we are delighted you have selected Belfast for your visit, and we hail with the greatest pleasure the benefits bound to accrue from the excellent papers to be read and the discussions which will follow. I am very much pleased to hear from your President that the very fact of the visit of this important body to such a city as Belfast always does good. It is a gratifying fact that all those deficiencies which sometimes arise in associations seem to be removed, and such visits as the present are bound to have that effect. I have had the pleasure, since I was honoured with the position of being Lord Mayor, to welcome several important associations to the city; but I can say that there is none we are more dependent upon, or one that I have a greater respect for, than your Association.

We are all subject to the ills to which flesh is heir, and if your Association cannot cure them I do not know where we are to look for aid. When I see such excellent men around me—men of whom I have heard, and whose characters have been stamped on the books

they have written—I am sure the visit of this Conference to Belfast will do immense good, and we will be rejoiced that we have received the British Pharmaceutical Association in Belfast. I notice that your first meeting was held in Newcastle in 1863, and I observe an important resolution in your book for that year: for the reports of those annual meetings and the papers are published every year as a record of what is taking place—an excellent idea that might be followed by kindred associations. The resolution to which I allude was put on the books by one of the members who has had more to do than any one else in bringing the Conference to Belfast. I refer to Mr. Payne. I do not wish to praise that gentleman in his presence. Mr. Payne is a man who does not care about flattery, but he occupies one of the most important positions in Belfast. He is a most useful citizen, and when we are in any difficulty, either in the magisterial position or any other way, we have only to call upon him, and he assists most loyally. The point I wish to mention is that Mr. Payne brought forward a resolution that “in the future their Conferences do not of necessity meet in the same town and at the same time as the British Association.” That was a wise rule, and I congratulate the Conference in having agreed to it. The British Association is one of the most important bodies we have in the country, and no other meeting—no matter how important—should clash with its arrangements. I can assure the members of this Association that we are very pleased to have you in Belfast, because while you are here I hope, with the assistance of the two ladies on my right and left, that you will have an opportunity of seeing all there is to be seen in Belfast. This is now the largest city in Ireland, and I think you will agree with me that it is a very fair city to take charge of. We have several very excellent boards, the members of which do their duty in a most admirable manner without fee or reward, and it is one of the most gratifying facts of public life to see the very strict attention that the members of the various public boards pay to all their duties. I congratulate you very much on your presence in Belfast, and I can assure you on behalf of the citizens, on behalf of the Corporation, and on behalf of the other boards to which I have referred, that you are welcome most heartily to our city.

The Rev. Dr. HAMILTON, who was warmly greeted, said:—It is my pleasant privilege, on behalf of the Queen's College, to give a hearty welcome to the members of the British Pharmaceutical Association. When my friend, Mr. Payne,—and every word spoken about him by the Lord Mayor I most heartily endorse,—called

upon me in company with their honorary local secretary, to ask the use of the buildings for their meetings, it was with the greatest pleasure that I was able to accede to their request. Fortunately their meetings occurred in our July vacations, when the college is empty, and when, consequently, without interfering with our proper business, we could welcome you and afford you every facility in our power. It has been our good fortune in our college to receive many very important and distinguished public bodies. The British Association for the Advancement of Science met twice here—first in 1852, and afterwards in 1874, under the presidency of my dear and lamented friend the late Professor Tyndall. Later on we received the British Medical Association, who had a memorable meeting within the walls of the college, and since that time various other important public bodies—such as the Journalists' Institute, the Institute of Mechanical Engineers, and others—were gladly given accommodation for their annual meetings; but I can truly say that to nobody have we given, or could we have given, a heartier welcome than we give to your Association. I quite agree with my friend, the Lord Mayor, as to the importance of the pharmaceutical chemist in our daily life. The doctor is a very important personage when we are ill, but what could a doctor do if his prescriptions were not carefully compounded with the purest drugs, accurately weighed and measured, and put up in such a way as to almost tempt the appetite of the patient? I have much pleasure in cordially welcoming you to Belfast and this college.

Dr. NELSON (President of the Ulster Medical Association) also briefly welcomed the Conference to Belfast.

Professor WHITLA, in adding his welcome on behalf of the medical profession, said he was regarded as a sort of missing link between the scientific pharmacist and the practising physician. There was no city in the British Empire where there was a closer and more friendly relationship existing between the medical faculty and the pharmacist. In the northern capital of Ireland it had long been recognised that the pharmacist prepared, sometimes discovered, and sometimes even, out of nothing, created, the weapons with which the doctors had to fight their battle against disease, and they regarded the pharmacist as a co-worker.

The PRESIDENT said he had in the first place to express the indebtedness of himself and the delegates to the President of the College, and the Lord Mayor of Belfast for their presence amongst them, and for the kindly manner in which they had spoken to them. It was clear that they had made themselves familiar with the

objects of the Conference, and were thoroughly in touch with the aims which they wished to accomplish, and they all appreciated very much the kindness of the President in placing the college at their disposal for the carrying out of their programme. They met that morning under most pleasurable circumstances, and he should like to meet the man or woman who did not understand the warmth of the welcome extended to them. It made them all feel so much at home. They felt that they had been in Belfast quite a long time, and by removing the want of sympathy amongst strangers the words of the Lord Mayor and President Hamilton made them realize that they were amongst good friends. On behalf of the Conference he desired to thank those gentlemen for the very cordial welcome which they extended to them. He knew the Lord Mayor had a very busy day before him, and it must have been at no small inconvenience he was with them that morning. They must know that in the administration of the affairs of so large a city as Belfast the Lord Mayor had a busy and anxious time, and they would therefore excuse him when he could not be amongst them during the course of their deliberations. A Lord Mayor could do most things, but he could not well be in two places at one time. They thanked the gentlemen who had spoken, and they greatly appreciated the very hearty welcome which they had given them.

The PRESIDENT then delivered his address:—

PRESIDENT'S ADDRESS.

Ladies and gentlemen,—A second time in our history has the "Sister Isle" invited the British Pharmaceutical Conference to hold its annual meeting of members on Irish soil, and a second time has it given us the greatest possible pleasure to accept the invitation. Those of us who attended the Dublin meeting just twenty years ago, under the Presidency of the late lamented George Frederick Schacht, will remember the enthusiastic reception accorded to us by our Irish friends on that occasion; the warm and deep interest shown in our proceedings, the largeheartedness and fellowship which marked the period of our visit, and the lasting friendships which were formed. To-day this great and beautiful city of Belfast offers us equally friendly greetings, and thus assures us of its loyalty to the cause we seek to promote.

PHARMACY AND ADVANCEMENT.

The science of Pharmacy knows nothing of political differences or diplomatic relations. It simply recognises in the broadest manner

the brotherhood of pharmacists, the consolidation of thought, the consensus of opinion of those who practise it, the promotion of whatever conduces to the elevation and advancement of our calling. A more complete knowledge of the materials and the achievement of greater perfection in the appliances with which we have to deal; greater ability to fill our legitimate position as joint labourers with the sanitarians in the prevention of disease, and with the Medical Profession in the noble work of alleviating human suffering and in the healing art. In short, whatever pertains to the real good and the general advancement of the craft. This general advancement is attempted and we believe is, to a considerable extent, accomplished by means which may be divided under several distinct heads, but all bearing close relationship to each other. First and foremost amongst these stands education. Up to the dates of the passing of the Pharmacy Acts every man was a law to himself as to how much knowledge he cared to possess for the conduct of his business, but I am not one of those who believe that in the earlier days a relatively greater proportion of ignorance prevailed in pharmacy than during the early days of other professions. In fact, a little reflection will bring to mind the names of "pharmaceutical giants" who existed before the Pharmacy Act found a place in the Statute books, and whose work will always be recognised as the foundation on which our craft has been built. What, however, has happened is that all who practise our craft must now possess knowledge up to a certain standard, and that standard, determined by the Councils of the Pharmaceutical Societies of Great Britain and Ireland respectively, is applied by the various boards of examiners.

THE INFLUENCE OF EXAMINATIONS.

Examinations are undoubtedly a stimulus to study and, being conducted largely by men who understand the requirements of the examinees, they are extremely useful, and in great measure accomplish the object contemplated; but the thoroughness with which the knowledge is acquired to pass them, and the way in which that knowledge is afterward applied, afford the true measure of their usefulness both to ourselves and to the public. The chief danger of our present system is that men will be content with the minimum of knowledge necessary to pass the qualifying examination, and will then believe that they have done all that is requisite in the way of study to fill the position in life which they have chosen; whereas, in my experience, which now extends over a number of

years, the majority of men, when just fresh from their examinations, are then only in a position to learn how to expand, apply, and increase their knowledge for the efficient performance of their duties. This does not apply to pharmacy alone; indeed, so much did it apply to the medical student that, some few years ago, the curriculum was extended to include one year of practical application of the knowledge possessed before registration by the Medical Council.

THE CONFERENCE AS AN EDUCATING BODY.

Now, at this point the value of a body like the British Pharmaceutical Conference becomes evident. It at once points out to the so-called qualified man that there is no finality to his knowledge, that he has merely entered by the legitimate portal the field of applied science, investigation, and research; it offers him encouragement to devote himself more closely to the higher branches of his calling, and thus not only to give deeper interest to it, but to sweeten the labour and drudgery attendant on the more commonplace matters which go to make up the daily round of duty. Experts in chemistry, physics, botany, *materia medica* and other branches of science are busily engaged unfolding the mysteries of Nature, and it is an essential part of the pharmacist's duty to keep himself posted in the advances which are made, or he will soon drift behind the times and lose the position which he holds in public opinion. In addition to the foregoing an acquaintance with technical matters is essential. As British subjects we are all amenable to the Imperial laws, but there are some of those which have a special bearing on our calling, and define our relations to the State, to the public, and to ourselves. A knowledge of these is most essential to us, and yet, until recently, no steps were taken either to teach the essential points contained therein, or to ascertain if the man who desired a certificate of qualification possessed a reasonable amount of knowledge concerning them. It is gratifying to note that in Great Britain (and I trust the same applies to Ireland), candidates for examination are now required to show that they possess a practical knowledge of the one special Act which regulates their calling. Not only the Pharmacy Acts, but the Statutes relating to the Sale of Food and Drugs, Weights and Measures, Poisoned Grain, Arsenic, Petroleum, and Proprietary Medicines, as well as various Excise Regulations, all have points of special interest for us, indeed, I question whether there is any other calling on which so many Acts of Parliament have such a special bearing.

PHARMACISTS AND THE PHARMACY ACTS.

Many persons look on the Pharmacy Acts as measures whereby we have voluntarily imposed unnecessary burdens on ourselves. But without going into very ancient dates in the history of pharmacy it may be pointed out that those measures were in the first instance obtained as a means of protection, and of complying with the requirements of public opinion. The Medical Profession on the one hand, and the Government on the other, had from time to time endeavoured to obtain legislation which would materially, and it was feared prejudicially, affect the pharmacist's interests, and he had stood firmly and successfully on the defensive. The time arrived, however, when it was felt that some kind of organisation and legislation was absolutely necessary, and it was thought that it would be better to make an effort to accomplish this for ourselves rather than to leave it to others who could not fully appreciate the requirements and position of our craft. If, therefore, we are at times disposed to complain that the Pharmacy Act is not what we could wish it to be, and is defective in some important points, we must bear in mind that it was the result of a compromise, and that had it been left entirely to those outside our calling it would doubtless have been more imperfect than it now is, and we should have been burdened with some oppressive measures from which we are now free. The recently obtained Amendment Act, making membership available to all who pass the qualifying examination, and giving them a vote in the election of the governing body, is calculated to consolidate the Society, and hence is a step in the direction of consolidating the craft.

THE SALE OF POISONS.

The recent attempt of the Privy Council to pass a "Poisonous Substances" Bill points to the desirability of consolidation for the purpose of opposing such unsatisfactory measures when from time to time the occasion arises. The Privy Council has persistently refused to place carbolic acid, one of those deadly poisons whereby so many lives have been lost, on the Poison Schedule of the British Pharmacy Act, although this has been done in Ireland, and notwithstanding the pressure brought to bear on that body by the Pharmaceutical Society, by coroners, juries, and municipalities. I believe this is due to a great extent to misrepresentations being made as to the restriction of trade and injurious results from monopoly if this were done. As a sort of compromise this bill was intro-

duced, and without discussion passed the House of Lords, although a crude, imperfect, and erroneous measure. It met with such determined opposition on all hands before its first reading in the Commons that it has been abandoned. This Bill bears in itself the strongest evidence of the impracticability of a Government department attempting to legislate for matters which really belong to pharmacy.

THE DESIRABILITY OF RECIPROCITY.

The Irish Pharmacy Act, which is of more recent date than that of Great Britain, has most of its clauses based on those of the latter, but so modified as to meet the existing condition of pharmacy in Ireland at the time of its passing. It, too, is the result of a compromise, and leaves something to be desired on the part of our Irish friends. The united action of the two societies, if unable to bring about all the good desired, may do much in that direction. I look forward with hope and confidence to the time when there will be increased unity amongst all English-speaking pharmacists and pharmaceutical societies, and when there will be sufficient uniformity in the various qualifications to enable reciprocity to exist amongst them all. In some of the Colonies it is admitted that something has to be done before this can be accomplished, but it is clearly our duty to do what we can to forward any movement which is calculated to bring about so desirable a consummation.

THE PURITY OF MEDICINES.

For several years efforts have been made to pass an amended Food and Drugs Act, and it is very generally acknowledged that the present Act requires some amendment. So congested, however, has parliamentary business been, that still another session has nearly closed without a prospect of the proposed new measure becoming law. It is one of the objects of the Conference "to maintain uncompromisingly the principle of purity in medicines." We, therefore, hail with satisfaction anything which contributes to this object, and when we consider how small has been the number of proven cases of deliberate and fraudulent adulteration in recent years under the existing Act, I think the Conference may be congratulated on its good and useful work in investigating and exposing circumstances of this kind during the many years of its existence.

METRIC WEIGHTS AND MEASURES.

During the past twelve months, the use of the metric system of weights and measures has been legalised for commercial purposes

in Great Britain and Ireland. This must be regarded as a step in the right direction, for it previously seemed absurd that a business house could not use actual weights and measures in executing an export order for so many grammes, litres, etc., of an article without committing an illegal act; but so it was. Now, this permissive stage will familiarise the public, slowly, with this system, which is more scientific and, when well known, is more simple than our own. But I have some sympathy with those who would not hastily have its general use made compulsory, as it will take a long time before the public mind is brought to think of quantities in metric terms instead of, as now, thinking in our own system, and then converting it into metric equivalents when necessary. If an apple is cut into two equal portions, and again each is equally divided, it seems much more easy to think of one of these as a quarter than as 0.25 of the whole, or, if the division is carried one stage further, an eighth is more easily realised than 0.125. The way in which a number will become fixed in the mind and influence thought is illustrated by the fact that although the decimal system has been used in France (where it originated) for so many years, one still sees in Paris some goods offered in the shops by the "dozen." Some thirty-eight years ago I remember Professor Redwood endeavoured to impress his students with the desirability of thinking in metric quantities, and suggested that those who were familiar with the size of the small dice would be assisted in realising the quantity of a cubic centimeter by regarding them as about equivalent values. Considerable alteration in our coinage will also be required before the decimal system can be rendered general in this country. As pharmacists it is our duty to familiarise ourselves with its use, and thus be prepared to forward a movement which will no doubt sooner or later obtain throughout the country, and is at present used almost invariably for scientific purposes.

CALCIUM CARBIDE AND METHYLATED SPIRIT.

Most of us are not affected sufficiently by the Petroleum Act to call for much comment thereon, but the regulations concerning the storage and sale of benzine have a decided bearing on our calling, and calcium carbide, now largely used for the production of acetylene gas for illuminating purposes, has recently been brought under its provisions. The sale of the carbide is a legitimate part of a pharmacist's business, and it is satisfactory that an exemption has been made, whereby it may be kept and sold without a licence, so long as it is stored in 1 lb. hermetically sealed canisters and not

more than 5 lbs. to be kept in stock at any one time. The Inland Revenue regulations affecting us remain the same as they have been for several years past, and we have still to regret that the abuse by a small section of the public of the methylated spirit privilege should have resulted in altered methods of methylating, which inconveniences a much larger section and modifies materially the advantages which we derive from its sale and use. The present kind, methylated with mineral naphtha, becomes turbid on mixing with water, and is unsuitable for many purposes for which the old kind containing wood naphtha could be used. It is true that the old kind can still be obtained under certain conditions for manufacturing purposes, but those pharmacists who formerly supplied pathologists and institutions with it can no longer do so; thus their business suffers without, so far as I can ascertain, any equivalent advantage to any one. I think some strong representation should be made to the Inland Revenue authorities with a view to getting this alteration repealed.

SYNTHETIC COMPOUNDS IN MEDICINE.

Turning now to the necessity for keeping up our knowledge of modern chemistry, we have evidence of this from the ever-growing list of physiologically active synthetic organic compounds. Many of these, which have been built up on theoretical considerations, have become valuable medicinal remedies. The fancy names given to them, however, rarely afford any definite idea of their composition, and without this we handle them in a very mechanical way, and lose much of interest that would otherwise attend the dealing with them. The pharmacist knows the nature and qualities, the habitat, process of production, and manufacture of the ordinary drugs and chemicals which he uses, and it is this knowledge, together with care and experience in handling them, which in the eye of the law constitutes qualification for the practice of his profession. It seems only reasonable, therefore, that he should familiarise himself as far as possible with the numerous class of substances which I have mentioned, for although they are of a complex nature, they are capable of much simplification by a consideration of the theoretical constitutions ascribed to them. It will be remembered that Mr. Hodgkin read a very excellent paper on this subject at a meeting of the Conference, held at Leeds in 1890. More recently Dr. Kohn, in an address delivered at a meeting of the Liverpool section of the Society of Chemical Industry, dealt with the relation which exists between the physiological

action and the chemical structure of these bodies. I have said that these remedies have been built up, and the term is an appropriate one, as it conveys to one's mind what actually happens. The scientific chemist is now the architect and builder, using certain atoms and molecules to build up chemical structures to meet the wants of the medical profession in the treatment of disease.

MADE IN GERMANY.

In Germany, where there are fewer restrictions on experimenting with animals than in this country, the chemist and physiologist work together, the one altering the molecules and molecular arrangement in the chemical, and the other testing and noting most carefully the effects obtained thereby; hence most of these remedies are produced in that country, and this manufacture has become an extensive chemical industry. I would not be understood to object to the use of fancy names instead of descriptive ones for these synthetic substances, as obviously the use of the latter would in many cases be impracticable. For example, it is much more convenient to speak of or write antipyrin than phenyldimethylpyrazolon, and of eucaine rather than benzoylmethyltetramethyl- γ -oxypiperidine-carbonic-methylester. Just as it is more convenient to speak of a cottage, villa, or mansion rather than to use a name which would describe the materials of which either is built and its dimensions. What I hold is that each package or wrapper in which these substances are enclosed should bear a clear and concise description, the formula, and, where practicable, tests should be named whereby it could be identified.

SOME NEW SYNTHETIC REMEDIES.

Since the publication of Mr. Hodgkin's paper, many new synthetic remedies have been introduced, and it may be convenient here to enumerate some of them, together with their formulæ:—

Agathin— $C_6H_4 \cdot OH \cdot CH \cdot NH \cdot CH_3 \cdot C_6H_5$ —Salicyl-methyl-phenyl-hydrazone. Antirheumatic.

Airol— $C_7H_2(OH)_4CO_2Bi$ —Bismuthoxy-iodo-gallate. Antiseptic.

Argonin. Silver caseinate. Antiseptic.

Aristol— $C_{20}H_{21}O_2I_2$ —Di-thymol-iodide. Antiseptic.

Analgen— $C_9H_5(OCH_2H_5)NH(CO \cdot C_6H_5)Na$ —Ortho-ethoxy-ana-mono-benzoyl-amido-chinolin. Antipyretic. Analgesic.

Antiseptol. Cinchonine iodosulphate. Antiseptic.

Asaprol— $CaC_{20}H_{14}S_2O_8 + 3H_2O$ —Calcium-beta-naphthol-sulphonate. Antirheumatic. Antituberculous.

Aseptol— $C_6H_4(OH)SO_3H$ —Phenol-sulphonic acid.

Alumzol. Aluminium naphtho-sulphonate. Astringent. Antiseptic.

Benzosol— $C_6H_4(OC_6H_5)OC_6H_5CO$ —Benzoyl-guaiacol. Antituberculous. Antiseptic.

Bismal— $4C_{15}H_{12}O_{10}3Bi(OH)_3$ —Bismuth methylene-digallate. Astringent.

Bromol— $C_6H_2 \cdot Br_3O \cdot H$ —Tri-bromo-phenol. Antiseptic and disinfectant.

Chloralamid— $C_3H_4O_2Cl_3N$ —Chloral formamidate. Hypnotic and analgesic.

Creosol— $C_6H_3CH_3(OC_6H_5)OH$ —Homo-pyro-catechin-mono-methyl-ether. Antiseptic.

Diuretin— $C_7H_7N_4O_2 \cdot Na + C_6H_4(OH)CO_2N$ —Theobromine-sodium-salicylate. Diuretic.

Durol— $C_6H_2CH_2CH_3CH_3CH_3$ —Tetra-methyl-benzol.

Dermatol— $Bi(OH)_3C_7H_5O_5$ —Bismuth subgallate. Astringent. Antiseptic.

Eucaine Hydrochloride— $C_{19}H_{27}NO_4 \cdot HCl + H_2O$ —Benzoyl-methyl-tetra-methyl- γ -oxy-tetra-piperidin-carbonic-methyl-ester hydrochloride. Local anaesthetic.

Europhen— $C_4H_9(CO_3)(O)C_6H_3C_6H_2 \cdot OI \cdot C_6H_5C_4H_9$ —Iso-butyl-ortho-cresol-iodide. Antiseptic. Antisyphilitic.

Guaiacol Synthetic— $C_6H_4(COH)COH_3$ —Pyro-catechin-methyl-ether. Antituberculous antiseptic.

Guaiacol Carbonate— $C_6H_4(OC_6H_5)2CO_3$ —Guaiacol-ester Carbonate. Antituberculous antiseptic.

Heliotropin. Piperonal. Proto-catechu-aldehyde-methyl-ester. Antiseptic. Antipyretic. Used in perfumery.

Hypnal— $CCl_3CH \cdot (OH_2)C_{11}H_{12} \cdot N_2O$ —Chloral-hydrate-antipyrin. Analgesic. Antipyretic.

Hypnone— $C_6H_5CO \cdot CH_3$ —Phenyl-methyl-ketone-aceto-phenone. Hypnotic.

Iodol— C_4I_4NH —Tetra-iodo-pyrrol. Antiseptic.

Itrol— $Ag_3C_6H_5O_7$ —Silver citrate. Antiseptic in treatment of wounds.

Lactophenine— $C_6H_4(OC_2H_5)NH \cdot CO \cdot CH(OH) \cdot CH_3$ —Lactyl-amido-phenol-ethyl-ether.

Loretin— $C_9H_4NI \cdot OH \cdot SO_3H$ —Ortho-oxychinolin-m-iodo-ana-sulphonate. Antiseptic.

Lycetol. Dimethyl-piperazin-tartrate. Analgesic. Diuretic.

Losophan— $C_6HI_3 \cdot OH \cdot CH_3$ —Tri-iodo-meta-cresol. Astringent. Antiseptic.

Lyridine— $(C \cdot H_2)_2NH \cdot N \cdot C \cdot CH_3$ —Methyl-dihydro-glyoxaline. Uric Acid Solvent.

Malakin— $C_{15}H_{15}O_2N$ —Salicyl-amido-phenol-ethyl ether. Antiseptic. Analgesic.

Microcidin. Sodium beta-naphtholate. Used in Antiseptic Surgery.

Nosophen— $(C_6H_4I_2OH)_2 \cdot C \cdot C_6H_4CO : O$ —Iodophen. Tetra-iodo-phenol-phthalein. Antiseptic. Disinfectant.

Orthoform. Para-amido-m-oxybenzoic-methyl-ester. Local Anaesthetic

Phenocoll Hydrochloride — $C_6H_4(OC_2H_5)(NHCOCH_2NH_2)HCl$ — Amido-acet-phenetidin-hydrochloride. Analgesic. Antirheumatic.

Piperazin — $C_2H_4(NH_2)C_2H_4$ — Diethylene-diamine. Antirheumatic.

Piperonal. Heliotropine. See above.

Resorcinol. Iodoform and resorcin. Antiseptic dressing.

Salophen — $C_6H_4OH \cdot COO \cdot C_6H_4N \cdot H \cdot COCH_3$ — Acetyl-para-amido-salol. Antiseptic. Antipyretic.

Salipyrin — $C_{11}H_{12}N_2O \cdot C_7H_6O_3$ — Antipyrin salicylate. Antipyretic. Analgesic.

Salacetol — $C_6H_4(OH) \cdot COO \cdot CH_2CO \cdot CH_3$ — Acetol-salicylic-ester. Antiseptic. Antirheumatic.

Symphorol N. — $C_8H_9N_4O_2 \cdot SO_3Na$ — Caffeine sodium sulphate. Diuretic. There are also lithium and strontium salts.

Tannalbin. Tannin albuminate. Astringent.

Terpinol — $(C_{10}H_{16})_2H_2O$ — Terpin hydrate derivative. Used in bronchial affections and in perfumery.

Tetronal — $(C_2H_5)_2 \cdot C(C_2H_5SO_2)_2$ — Di-ethyl-sulphon-diethyl-methane. Hypnotic and sedative.

Thalline Sulphate — $(C_{10}H_{13}NO)_2H_2SO_4$ — Tetra-hydro-para-chinanisol sulphate. Haemostatic and antiseptic.

Triphenine — $C_6H_4OC_2H_5NHCH_2H_5CO$ — Propionyl-phenetidine. Analgesic. Antipyretic.

Thermodine — $C_6H_4(C_2H_5O)NCO_2C_2H_5COCH_3$ — Acetyl-*p*-ethoxy-phenyl-urethane. Antipyretic. Antiseptic.

Peronine — $C_{17}H_{18}NO_2 \cdot O \cdot C_6H_5 \cdot CH_2 \cdot HCl$ — Benzyl-morphin-hydrochloride. Narcotic.

Creolin, Lysol, Solveol, and Solutol are more or less impure cresol mixtures obtained from coal tar.

Of the fifty substances enumerated, it will be noted that a large percentage possess antiseptic, antipyretic, and analgesic properties; so that their rapid growth would seem to be due more to commercial enterprise than to meeting a real want in medical practice.

SYNTHETIC ODOROUS SUBSTANCES.

Another chemical industry, which has considerable interest for the pharmacist, is the production of synthetic esters and odorous substances closely related to the odours of flowers, plants, and animal substances. With artificial musk and vanillin we have been long familiar, as also with the amyl, butyl, and ethyl compounds resembling fruit flavours, but of more recent date we have heliotropine (heliotrope), ionone and iraldine (violet), cumarine (new-mown hay), terpineol (lilac), bergamiol or linaloyl acetate (bergamotte), nerolin (neroly), jasmin oil, anisic aldehyde (hawthorn), geranol (rose geranium), carvol (caraway oil), safrol (oil of

sassafras), etc., etc. So much has this industry grown that not only are these products used for toilet soaps, but enter largely into the composition of the essences named after the flowers. They are more persistent than the natural odours, and I am told that the very popular essence of "Parma Violets" is, as a rule, quite innocent of the flowers, and is prepared from ionone mellowed down with small quantities of other extracts, and this the public really prefer. To those, however, who are accustomed to handle delicate perfumes there is not so much difficulty in distinguishing between the artificial and the real, and it still taxes the skill of the chemist and the art of the perfumer to obtain that subtle delicacy of fragrance manufactured and elaborated in Nature's own laboratory.

PARAFFINS AS MEDICINAL BASES.

Although paraffins, hard and soft, have been much used as applications to the skin, it has generally been recognised that they are not readily absorbed by it, and their use as a vehicle for various medicaments has been objected to on that ground; the addition of lard or wool-fat being considered necessary to obtain the desired result. The great advantage which the paraffins possess of not becoming oxidised by exposure to the air, hence of not becoming rancid, has acquired for them considerable popularity and an extensive use. Of comparatively recent date there has been introduced from Germany a class of liquids which are said to be oxidised paraffin oils, medicated in various ways and known as valsols. The oxidation is said to bring them into a condition in which they are readily absorbed by the skin, and are therefore valuable vehicles for the medicaments they carry. This statement as to oxidation seems so contrary to our previous notions concerning the paraffins that an investigation into the subject would be of considerable interest, and would form matter for a paper at a future meeting of this Conference. In the meantime I would not wish to question the value of these bodies, but, so far as I can judge, it is not the pure paraffin which becomes oxidised, but rather the various substances usually found accompanying it in the commercial article.

THE BRITISH PHARMACOPEIA, 1898.

In the world of pharmacy, the event of the year has been the publication of the new British Pharmacopœia. The fact that it offers a few alternative formulæ in certain preparations which may be made in or for India and the Colonies cannot be regarded as

rendering it Imperial or Colonial, but the appendix which, it is understood, is to be published in about eighteen months or two years, will doubtless render the work complete in this respect. The new Pharmacopœia has already received some adverse criticism from Mr. Howard, Mr. Warington, Mr. Fletcher, Mr. Umney, Mr. Corder, Mr. Parry, Mr. Bryant and others, and the points raised are well worth consideration, but probably, when we become accustomed to the altered formulæ, etc., there will be reason to believe that the work largely represents the advances which have been made in pharmacy since 1885; at least it should do, seeing that it has taken about four and a half years to produce. To judge fairly of the work, it appears to me, we ought to know what was in the mind of the Medical Council when, in December, 1893, it was decided that a new edition of the Pharmacopœia was required. This we are to some extent able to do by reference to an article by Professor Leech in the *Medical Chronicle* of April last, where he writes as follows: "The propriety of rendering it (the Pharmacopœia) more useful to the colonies and dependencies than it had hitherto been was generally acknowledged, but on other points very diverse views existed. Some, notably Sir Richard Quain, considered but little further change was needed than to add some of the approved new remedies and excise a few of those which had become less used. But the letters and articles which appeared in the medical papers as soon as it became known that a new Pharmacopœia was contemplated, showed that there was a widespread feeling that something more was required. Those who were compelled to make the Pharmacopœia the basis for their teaching, the lecturers on materia medica at the various schools, were among the most adverse critics of the Pharmacopœia, pointing out its shortcomings and many errors; while chemists, botanists and pharmacists were no less insistent in calling for a thorough revision of all parts of the work. Eventually arrangements were made for such revision."

PHARMACISTS AND THE PHARMACOPŒIA.

Here, then, we have the text for what has been attempted, and to the extent to which the work falls short of the object aimed at it is open to fair criticism. I will not enlarge on my oft-repeated objection to the constitution of the Pharmacopœia Committee; it is well known, and I trust in time it will be removed. I am quite aware that the Act of Parliament makes the Medical Council responsible for the publication of the work, but I have yet to learn

that the Committee appointed by that body may not consist partly of pharmacists. Without being tedious, let me give you an example of where, I think, the experience of practical pharmacists would have and may come in. Professor Leech tells us in the article quoted that the reason why saffron was retained in decoction of aloes, although omitted from tinct. rhei. co., pil. aloes et myrrhæ, and pulv. cretæ aromat., was on the ground that it improves its taste, and that a decoction prepared without it was not so pleasant as that prepared with saffron. But it does not appear to have been taken into account that extract of Barbados aloes, which is more bitter and less aromatic, has been substituted for that of Socotrine, that by keeping for some time, decoction of aloes loses much of its nauseous taste and mellows so as to become almost unobjectionable. It could only be on the homœopathic principle *similia similibus curantur* that saffron could cure the nauseous taste of anything.

OF PHARMACOPŒIA PUBLICATION.

It is not my intention to deal with the criticisms which have been made, as doubtless you are all familiar with them; but I may point out a method of procedure with reference to the publication of the work which would have rendered most of them unnecessary, would have saved much inconvenience and uncertainty, and would probably have secured it for more complete observance than now exists. We are told that the proof was ready in February, and that no material alteration has since been made. Such being the case, why should there have been so much mystery about the publication? Would it not have been better that proof copies should have been sent to the various medical and pharmaceutical journals under certain restrictions, perhaps, but with a view to publicly calling attention to the proposed alterations for the purpose of inviting criticism? Reasonable objections could then have been considered by the Committee. The work could have been issued at the end of May and gazetted (which legally constitutes publication) at the end of June. I am aware that the able editor of the Pharmacopœia kept a record of the various suggestions for improved processes, etc., which appear from time to time in the various journals, or were made at this Conference, and there is evidence that the *Year-Book of Pharmacy* and the *Unofficial Formulæ* have been useful books for reference during the compilation of the official work. There are, however, those engaged in pharmacy who do not publish the many small matters which

they observe and think about, but whose opinions on matters of detail would be valuable, and would be ensured by dealing with the work in the manner which I have suggested. Perhaps those in authority would consider that such a procedure would detract from the importance of the work, but Acts of Parliament are not framed and passed in secret, and are not made law before their provisions are known. I do not hold that in Germany they do everything better than we do in this country, but they are certainly in advance of us in their methods of producing a pharmacopœia. In addition to having a properly constituted pharmacopœia committee, they publish from time to time (in fact are now publishing in the *Archiv der Pharmacie*) the suggestions which have been made and the alterations which are contemplated for a future edition of the work, long before it is taken in hand for publication. In this way every detail is considered by all who are concerned and are to be affected by its contents, so that when the work assumes the position of legal authority all are fully prepared to obey its dictates, and it has the endorsement of the entire medical and pharmaceutical professions. We shall all, I think, approve of the more general introduction of the metric system into the work, and there are many other alterations which must commend themselves to us, but I will not anticipate the papers which are to be read at this meeting by entering into details, which will no doubt be ably dealt with by the gentlemen who have them in hand.

IN PRAISE OF IRELAND.

In view of these interesting papers I am anxious not to weary you with a long address, but I cannot close without referring to the fact that to-day we are the guests of a warm-hearted and generous people, who, like ourselves, are British, and whose interests are closely interwoven with—in short, are identical with our own; that we are in a country at once beautiful and possessed of great natural resources, capable of much development. The lakes, gleus, rocks, rivers, the wild romantic scenery, are all too well known to require comment; but the mineral wealth of Ireland is greater than most people suppose it to be. The coalfields of Leinster, Munster, Connaught, and Tyrone; the immense stores of red hæmatite, bog iron ore and pyrites; the copper mines of Wicklow, Waterford and Cork. Lead, rich in silver, native silver, arsenic, antimony, baryta, magnesia, etc. To these may be added the gold found in Limerick and Tipperary which, if ener-

getically sought, may prove a veritable Klondike nearer home. The fruitful soil, the climate rendered uniform and less severe than that of England or Scotland by the salutary influence of the Gulf Stream, tend to render the country one which will well repay the expenditure of capital in judicious enterprise. It seems probable that *Eucalyptus globulus* could be cultivated with advantage in the central plains of the island, and that its culture would improve the condition of the soil where excessive moisture exists. In suitable soil it is probable that the climate would be adapted to the cultivation of some herbaceous medicinal plants, such as peppermint, spearmint, etc. Some of the medicinal plants which are grown in North America could doubtless be cultivated with profit in the "Emerald Isle," if a proper selection were made, and their habitat were duly studied. In Belfast we are in a veritable hive of commercial industry, and I know of no legitimate reason why large commercial centres of a similar character should not exist in other parts of this country of so much promise, so well situated and accessible to all parts of the world.

THE LATE MICHAEL CONROY.

It was my hope that I should have been able to conclude without having to record the death of any member of the Conference during the past year, but such is not my good fortune. Michael Conroy, a former Vice-President, an active member of the Conference, and an Irishman withal, has gone to his rest. He was only fifty-four years of age when he passed away, and we could have hoped to have had his active co-operation, his genial presence, and a continuation of his useful work for some years to come. He possessed a large amount of good reliable information on matters connected with our craft, and took an active part in the discussions at our meetings. He will be remembered by many here as Chairman of the smoking concerts held as part of the social programme at our gatherings for many years, in which his cheerful inspiring cordiality was always exhibited. The Executive Committee have already expressed, through the Honorary Secretaries, their deep sympathy with his widow and family in their bereavement. Personally, I feel his loss to be that of a much esteemed friend, with whom I could always discuss matters relating to chemistry and pharmacy with pleasure and profit.

THE LATE DR. DE VRIJ.

Since this address was written, another eminent man has passed away; I refer to Dr. de Vrij, of the Hague. Just fifty-two years

ago Dr. de Vrij first visited England as the representative of the "Batavian Society of Experimental Philosophy" at a meeting of the British Association at Oxford, so that in those days he had attained to an eminent scientific position. During his long life his published works and papers and communications numbered over 200, on various scientific subjects. He was the son of a pharmacist, and during the early part of his life he devoted himself to that profession. His chief work which directly affected us was the investigation of the cinchona alkaloids and in connection with cinchona cultivation in Java and India. His work was officially recognised by honours from the Dutch and French Governments and by our Queen, who conferred on him the Order of Companion of the Indian Empire. Last year as your President I had the honour of joining with the President of the Pharmaceutical Society, Mr. Carteighe, and the Presidents of the Linnean and Chemical Societies in awarding to Dr. de Vrij the "Hanbury Gold Medal," a distinction which he well merited. He was unable to receive it in person, but he wrote a letter expressing his appreciation of the honour, and stating that, although eighty-four years of age, all his senses and his intellectual faculties remained unimpaired. In 1871 he was elected an honorary member of Conference, so that he had been associated with us for twenty-seven years. He was an example of a man of high intellectual ability, devoting his powers to the purpose of serving his day and generation, passing away at a ripe age honoured and esteemed. Last evening your Executive passed a resolution of condolence with his family, which I am sure you will to-day endorse.

Sir JAMES HASLETT, M.P., in moving a vote of thanks to the President for his address, commenced by joining on behalf of the citizens of Belfast in the welcome which had already been extended to the Conference. He was glad to find that this visit had helped to remove any little points of difference which might have existed between various phases of the calling in Ireland, and hoped that the leading differences which existed between the Irish and English practice would soon pass away too, and that there might be one general system of examination and qualification for all, so that the trade might be common to all in England, Ireland, and Scotland. He was aware that there were difficulties in the way, but if the members of the Conference helped to remove them he should be glad. He did not like Irishmen to go to England with any badge

of inferiority, because they were equal to most men and superior to all. He hoped some of their good friends who had come over would lose their return tickets, as had happened before to some of their Scotch friends. He did not sympathise with a remark he recently heard that these people would come and spy out the land, set up in opposition, and get all the business. He had no fear of that, for it was cut so fine that there would be no living for an Englishman, and even Irishmen sometimes found it difficult to get potatoes and salt. The President had referred in his address to the question of scheduled poisons, and especially to carbolic acid, which was largely used in committing suicide; but the difficulty in putting such an article on the schedule was no doubt the large extent to which it was used in industry. With regard to methylated spirit his own view was that anyone who could drink it ought to be allowed to do so, and he did not think further legislation was required to prevent them. With regard to the metric system, he feared he was too old to change his mode of calculation, but he felt quite sure that for young men who could master it, it possessed a simplicity far in advance of the present system. With regard to the connection between medicine and pharmacy, it was as close and intimate as that between the organist and the organ blower, and both parties were equally entitled to claim a share in the result produced. With regard to the Pharmacopœia, no doubt it would have been more satisfactory if practical men had had more to do with it; he could only express his own opinion that it was infinitely inferior to Dr. Whitt's edition. That was by no means such dry reading as the present one, in fact he could bear living testimony to the fact that it was actually fire-proof, for when their premises in North Street were burnt down, it was almost the only thing that escaped destruction, and it still remained, burned outside, but intact within, and he could cordially recommend it for the information it contained. He concluded by an eloquent and sympathetic reference to those who had passed away, suggesting the lesson that all should so fulfil their duties through life that, when called away, they would also be mentioned in similar terms of regret.

Mr. J. C. C. PAYNE, J.P., had much pleasure in seconding the vote of thanks so ably proposed by Sir James Haslett, M.P.

Mr. S. R. ATKINS, J.P., supported the motion with the greatest possible pleasure. They had had an excellent address, and they all remembered, he was sure, how in Glasgow last year Dr. Symes gave them a splendid *résumé* of the past work of the Conference. His

address that morning was one full of practical importance, dealt with from practical and scientific knowledge of pharmacy, and from extensive observation on his own part. In the Council of London he was recognised as a typical pharmacist. Having alluded to the late George Frederick Schacht, whom they had with them in Dublin twenty years ago, and who had rendered splendid services, he would say they were grateful for the presence of the ladies. They all knew of the beauty of Irish women, the eloquence of Irish statesmen, the bravery of Irish soldiers, and the hospitality of Irishmen which was known all over the world. He had pleasure in supporting and conveying the vote of thanks which was so much deserved.

The resolution was passed with enthusiasm.

The PRESIDENT said he had been somewhat overwhelmed by the manner in which the resolution had been proposed and received. He could only thank the meeting for the attention they had given to his address.

The Lord Mayor and Principal Hamilton then retired.

Mr. PAYNE came forward to say that the President of the Ladies' Committee, Mrs. Clotworthy, had arranged for a visit to Messrs. Robinson and Cleaver's and Marcus Ward and Co.'s works and carriages were in waiting for all ladies who would prefer to go there rather than to hear the papers. This was so popular that none but the sterner sex were left in the library, and the place looked dull in consequence.

LETTERS OF APOLOGY FOR ABSENCE.

Mr. Secretary NAYLOR announced that letters of regret for non-attendance had been received from F. B. Benger, F.I.C., F.C.S. (Manchester); Prof. J. Attfield, Ph.D. F.R.S. (Watford); R. A. Cripps, F.I.C., F.C.S. (Hayward's Heath); T. B. Groves, F.C.S. (Weymouth); Walter Hills, F.C.S. (London); T. Maben, Ph.C., F.C.S. (Hawick); N. H. Martin, J.P., F.I.C., F.R.M.S. (Newcastle-on-Tyne); G. J. W. Newsholme, F.I.C., F.C.S. (Sheffield); Richard Reynolds, F.I.C., F.C.S., (Leeds); G. S. Taylor (London); Thos. Tyrer, F.I.C., F.C.S. (London); R. Wright, Ph.C., F.C.S. (Buxton); and Charles Umney, F.I.C., F.C.S. (London).

Amongst the letters of apology the following were read :—

LEEDS, *August 4, 1898.*

DEAR MR. NAYLOR,—Although I cannot have the pleasure of being present at the meeting of the British Pharmaceutical Conference at Belfast, I hope that I may be permitted to express my gratification at the period of vigorous existence which our institution is now enjoying. There is reason to think that the too abundant blows that have fallen upon those who practise pharmacy have had the result of welding their social instincts. The latest illustration of this is a very recent episode in attempted legislation affecting both British and Irish pharmacy. Had this danger threatened longer, we know that with a good cause our united parliamentary forces would have been invincible.—Wishing you a very successful meeting,

I am, yours faithfully,

RICHARD REYNOLDS.

ASHLANDS, WATFORD,

August 6, 1898.

DEAR DR. SYMES.—After making all arrangements to be present at Belfast next week, I am much disappointed at being compelled to forego the pleasure. The sudden rupture of a large cyst that has latterly disfigured my head has placed me temporarily in the hands of the surgeon. Now the resources of surgery, medicine, and pharmacy are fit subjects for the brain of an Editor of a British Pharmacopœia; but when they take the tangible shape of an ugly mass of cotton-wool, phenol, and sticking-plaster on the scalp, they unfit him for the platform of a Pharmaceutical Conference. I am the more sorry because nearly every one of the announced papers has great interest for me. Please convey my regrets to my many friends and accept my congratulations on the apparently assured success of the meeting in both its scientific and social aspects.

Yours faithfully,

JOHN ATTFIELD.

CABLEGRAM FROM PROFESSOR REMINGTON.

The PRESIDENT then announced that Professor J. P. Remington, of Philadelphia, had telegraphed his hearty congratulations. It is pleasant, said the President, to think that Professor Remington has remembered us, and sent us his congratulations at the moment of meeting. Those of us who were present at the Glasgow meeting will remember what an enthusiastic pharmacist he is, and how much he contributed to that meeting.

RECEPTION OF DELEGATES.

Mr. F. RANSOM (Hon. Gen. Sec.) read the following list of delegates to the meeting :—

Pharmaceutical Society of Great Britain.—Messrs. W. Hills (President), G. T. W. Newsholme (Vice-President), S. R. Atkins, T. Bateson, M. Carteighe, N. M. Grose, J. Johnston, W. Martindale, C. J. Park, C. Symes, W. Warren, J. Rymer Young, and R. Bremridge (Secretary).

North British Branch.—Messrs. J. Laidlaw Ewing (Chairman), W. L. Currie (Vice-Chairman), J. Bowman, G. Coull, A. Davidson, J. H. Fisher, G. Lunan, C. Kerr, D. McLaren, J. Moir, and J. Nesbit.

Pharmaceutical Society of Ireland.—Messrs. R. J. Downes (President), G. D. Beggs (Vice-President), J. E. Connor, H. Conyngham, P. Kelly, J. Montgomery, T. O. Sullivan, W. F. Wells, jun., Professor C. R. C. Tichborne, and Dr. J. A. Walsh.

Brighton Association of Pharmacy.—Messrs. C. S. Ashton, H. A. Costerton, W. H. Gibson, W. W. Savage, S. G. Weston, and C. G. Yates.

Bristol Pharmaceutical Association.—Messrs. B. Keen and J. Pitman.

Cambridge Pharmaceutical Association.—Mr. E. Saville Peck.

Edinburgh Chemists', Assistants', and Apprentices' Association.—Messrs. G. Lunan and D. McLaren.

Forfarshire and District Chemists' Association.—Messrs. C. Kerr (President), A. B. Anderson, A. Davidson, David Ferrier, and A. Naysmith.

Glasgow and West of Scotland Pharmaceutical Association.—Messrs. W. L. Currie (President), R. McAdam (Vice-President), D. Watson (Hon. Sec.), R. Brodie, T. Dunlop, J. Foster, A. Fraser, John McMillan, R. McMurray, J. H. Riddell, A. M. Robertson, J. A. Russell, and Taylor.

Liverpool Chemists' Association.—Messrs. A. C. Abraham, J. Bain, E. Evans, jun., P. H. Marsden, T. H. Wardleworth, and W. Willings.

Manchester Pharmaceutical Association.—Messrs. Cooper, Johnstone, Kemp, Pidd, Wild, and Siebold.

Newcastle-on-Tyne and District Chemists' Association.—Messrs. T. Maltby Clague (President), G. F. Merson (Hon. Sec.), J. S. Dickson, G. Foggan, and L. Williamson.

Midland Pharmaceutical Association.—Messrs. J. Poole (Presi-

dent), R. Darton Gibbs, F. J. Gibson, C. F. Jarvis, and C. Thompson.

Lceads Chemists' Association.—Mr. F. W. Branson.

Ulster Pharmaceutical Association.—Mr. J. Tate (President), Dr. Fielden, Dr. Tweedie, Messrs. Connor, Guiler, Montgomery, Elliott, Moffitt, McKnight, and Payne.

Oxford and District Chemists' Association.—Mr. G. Claridge Druce.

North-East Lancashire Chemists' Association.—Councillor Shorrock and Mr. Holt.

Plymouth, Devonport, and Stonehouse Chemists' Association.—Messrs. C. J. Park and J. D. Turney.

Exeter Chemists' Association.—Mr. H. Wippell Gadd.

Mr. W. A. H. NAYLOR (Hon. Gen. Sec.) then read the following:—

REPORT OF THE EXECUTIVE COMMITTEE.

During the past year your Committee has met on several occasions to transact the business of the Conference and to take into consideration matters affecting its interests.

Since the last Annual Meeting 65 candidates have been elected to membership, 20 members have resigned, and 24 have been removed by death. An accession to our ranks is still much needed, and your Committee would again impress upon all members the necessity of personal effort in this direction.

Dr. G. N. Kernot having resigned his position as Honorary Colonial Secretary for the Presidency of Bengal, Mr. J. G. Prebble was appointed to succeed him, and Mr. J. Stanley Smith has been elected to the same position in the Presidency of Bombay, in succession to the late Mr. E. Beynon.

Mr. Louis Siebold, F.I.C., F.C.S., has again been appointed Editor of the *Year-Book*, and the MS. of Parts 1 to 3 of the forthcoming volume is already in the hands of the printers.

The Blue List has been subjected to revision by a Sub-Committee appointed for the purpose; several subjects have been omitted, while others which appear to deserve investigation have been added.

A grant of £5 in aid of research has been made to Mr. E. J. Parry, B.Sc., F.I.C., to defray expenses in connection with the further investigation of sandal wood oil.

Your Committee announces with regret that Mr. John Moss, F.I.C., F.C.S., owing to increased engagements, has asked to be

FINANCIAL STATEMENT FOR THE YEAR ENDING JUNE 30TH, 1898.

The Hon. Treasurer in Account with the British Pharmaceutical Conference.

1897	Dr.	£ s. d.	£ s. d.
July 1.	To Assets forward from last year:—		
	„ Cash in Secretary's hands	3 16 11	
	„ „ at Bank	48 19 5	
		<hr/>	52 16 4
	„ Subscriptions:—		
	June 30th, 1897		1 16 0
1898.			
	„ Sales of Year Book by Publishers		16 0 0
	„ Advertisements, 1896 vol.	0 6 6	
	„ „ 1897 vol.	82 11 11	
		<hr/>	82 18 5
	„ Sales of Index by Publishers	0 4 8	
	„ „ „ Secretary	0 2 6	
		<hr/>	0 7 2
	„ Sales of Unofficial Formulary by Publishers		1 7 4½
	„ Members' Subscriptions:—		
	From July 1, 1897, to June 30, 1898	384 2 10	
	Less not cleared at Bank	3 15 0	
		<hr/>	380 7 10
	„ Donation, Glasgow		20 0 0
	„ Grant for Research, Cheque not cashed		5 0 0
	„ Liability:—		
	Assistant-Secretary's Salary and Rent, March 25 to June 30, 1898		13 15 0
			<hr/>
			£574 8 1½
			<hr/>
1898.	Cr.	£ s. d.	£ s. d.
June 30.	By Expenses of Year-Book:—		
	Printing, Publishing, Bind- ing	191 11 10	
	Banding	3 18 2	
	Postage and Distributing	17 0 2	
	Advertising, Publisher's Charges, and Commission	22 13 7	
	Editor's Salary	150 0 0	
	Foreign Journals for Editor	6 0 6	
		<hr/>	391 4 3

1898.	Cr.	£	s.	d.
June 30.	By Unofficial Formulary :—			
	Advertising and Publisher's charges .	0	3	4½
	„ Sundry Expenses :—			
	Assistant Secretary at Glasgow	10	0	0
	Copies of President's Address	1	1	6
	-----	11	1	6
	„ Assistant Secretary's Salary :—			
	From July 1, 1897, to June 30, 1898	45	0	0
	Rent of Office from July 1, 1897, to June 30, 1898	10	0	0
	-----	55	0	0
	„ Blue List, Printing	3	7	6
	Postage	2	8	3
	-----	5	15	9
	„ Grant for Research	5	0	0
	„ Postages	12	10	3
	„ Postages and distributing Year-Book, Butler & Tanner, 1896	7	2	7
	„ Printing and Stationery	8	2	6
	„ Stationery	4	2	9
	-----	12	5	3
	„ Bank Charges	0	5	4
	„ Petty Cash expended	4	8	5
	„ Liabilities of last year since paid :—			
	Assistant-Secretary's Salary	13	15	0
	Butler & Tanner	14	15	3
	McCorquodale	5	9	6
	-----	33	19	9
	„ Cash in Secretary's hands :—			
	Petty Cash	2	3	6
	Stamps	0	6	6
	-----	2	10	0
	„ Cash at Bank	33	1	8
		£574	8	1½

The Bell and Hills Fund.

1897.		£	s.	d.	£	s.	d.
July 1.	To Balance in hand	17	14	10			
1896 and 1897.	„ One Year's Dividends on Consols	9	11	8	27	6	6
June 30.	By Purchase of Books for Glasgow	9	0	9			
		-----			9	0	9
	Balance at Bank				£18	5	9
	Assets { Cash Balance at Bank	£18	5	9			
	{ £360 2½ Consolidated Stock	360	0	0			

Examined and found correct.

July, 1898.

WILLIAM L. CURRIE, Glasgow.	} Auditors.
D. W. ELLIOTT, Belfast.	

relieved of the Office of Treasurer, and his duties as such will terminate after this meeting. Your Committee has expressed to Mr. Moss its most cordial thanks for the valuable service he has rendered the Conference during the past five years.

The Conference has lost by death during the past year a distinguished honorary member, Professor Dragendorff, of Rostock, a chemist who, both as author and as professor at the University of Dorpat, has contributed much to the promotion of pharmaceutical research. By the death of Mr. Michael Conroy, F.C.S., who was a Vice-President at the Liverpool Meeting in 1896, the Conference has lost one of its most able and frequent contributors. His ability and practical experience in technical pharmacy were evidenced in the papers which he contributed and in the part he took in the discussions, while his genial nature brought him into equal prominence in the social functions of our meetings. Amongst others who have passed away, reference must be made to Mr. E. Beynon, whose death followed shortly after his resignation already referred to; Mr. Thomas Glaesyer, who acted as honorary local secretary at the meeting of the Conference in Brighton; and Mr. W. Willmott, who has contributed several papers of interest.

At the moment of completing this report there comes the sad intelligence of the death of J. E. de Vrij, Ph.D., C.I.E., at the advanced age of 85. As a quinologist he had attained a reputation which gave him rank amongst the greatest authorities in this branch of knowledge. He was also early distinguished as a pharmacist, and later as a naturalist. For twenty-seven years he has been an honorary member of the Conference, and in the *Year-Books of Pharmacy* are to be found references to twenty-five of his many papers on cinchona bark or its alkaloids. Your Committee desires to pay its tribute of grateful acknowledgment to the memory of him who by his invaluable researches has greatly enriched our knowledge of a most important drug.

The loss which has annually to be recorded of so many of our active members should stimulate all those who remain to increased energy, and your Committee trusts that the disinterested loyalty which so characterised the founders and early supporters of the Conference may continue to inspire those upon whom the duty devolves to maintain the success of the Association.

Mr. JOHN MOSS (Hon. Treasurer) then read the financial statement. (See pages 334, 335.)

Mr. DRUCE (Oxford), in moving the adoption of the Report and Financial Statement, expressed his regret at the retirement of Mr. Moss.

Mr. BRANSON (Leeds) seconded the resolution, which passed unanimously.

REPORT OF THE UNOFFICIAL FORMULARY COMMITTEE.

Mr. W. MARTINDALE read the report of this Committee as follows :—

In presenting their report the Unofficial Formulary Committee have to inform the Conference that as some of their members were engaged in assisting the General Medical Council in the revision of the British Pharmacopœia during the last three years, it was considered advisable that the Formulary work should be in abeyance until the new Pharmacopœia was published. They have much pleasure in reporting that the Official Pharmacopœia has absorbed eighteen formulæ that were devised by the Unofficial Formulary Committee (some with slight modification). The Committee should now resume active work, and would suggest their reappointment.

Mr. COLLIER (London) proposed the adoption of the report.

Mr. E. SAVILLE PECK (Cambridge) seconded the resolution, which passed unanimously.

The reading and discussion of papers was then proceeded with the first being one on

KIESELGUHR AND OTHER INFUSORIAL EARTHS.

BY JOHN MOSS, F.I.C., F.C.S.

Infusorial earths having recently come into request by pharmacists, and being very diverse amongst themselves, as well as suitable for a variety of purposes, it may be useful to collect leading facts of special interest concerning them, and to indicate particular applications of which they are susceptible. That is all this short paper professes to do.

Kieselguhr is the German name for an infusorial earth which is found in Hanover. It means siliceous deposit, and aptly defines a

geological formation consisting of the minute fossil shields of diatoms, which is nearly pure silica in those parts nearer the surface, whilst in others lower down it is contaminated with more or less organic matter. In Hanover the deposit is 150 feet thick from the surface downwards. The upper stratum is nearly white, with very little organic matter; lower down it is grey, with very little sand, but more organic matter. The lowest and thickest stratum is, according to Thorpe, from 50 to 100 feet thick, and contains up to 30 per cent. of organic matter. We might argue from these facts that a process of oxidation goes on in the upper stratum, which changes the nature of the organic matter, rendering it more soluble and less coloured. A sudden rainfall would effectively wash this stratum, carrying the organic matter downwards to the lower stratum, which, being charged with air to an inferior degree, is less capable of assisting change; indeed it would seem to have the power of preventing it, hence the accumulation of green colour and organic matter, which are said to be due to extractive from the pine needles strewing the surface of the earth above the deposit. This organic matter, together with the colour, is got rid of by calcining in small furnaces, which are filled with the kieselguhr and then lighted at the bottom. The organic matter suffices to keep the whole in a glow, like peat, and the process is made continuous by raking out below and supplying fresh material at the top. The calcined product consists almost exclusively of silica, and varies from very pale cream to a reddish colour, according to the proportion of ferric oxide present. Beckersinn found 95 per cent. of SiO_2 and a specific heat of 0.2089. The strongest acids have, of course, no action upon it, but with alkalies it fuses easily, and a variety of soluble glass may be made in this way.

In France there occurs a similar siliceous earth called Randanite (from Randan in the Puy de Dôme).

Other deposits are found in Scotland, near Aberdeen, and in the island of Mull; in Norway, where it is called *bergmehl*; under the city of Richmond in Virginia, in the Bermudas, in Australia, in Algeria, in North Wales, at South Mourne, and in many other parts of the earth.

Infusorial earth consists of the siliceous envelope of Diatomaceæ, a family of minute uni-cellular plants, also called "Brittleworts," from the facility with which they may be cut or broken through. The siliceous envelopes, or *diatoms*, as they are commonly called, are usually of the most perfect symmetry, and often exhibit ela-

borately marked patterns of great delicacy, which endow them with extreme interest as microscopic objects. The forms may be simple or intricate, but all are beautiful. There are few objects so attractive to the microscopist as the minute siliceous framework of these low forms of plant life, and many hundreds of different varieties have been catalogued.

Having regard to the origin of these deposits, diatomite would seem to be a name generally appropriate, and I purpose using it in this sense, as including all the varieties of siliceous earth above referred to. I cannot hope to name every kind of diatom which has contributed to form each one of the deposits, but having examined several microscopically I may succeed in enumerating some of the more important individuals.

1. *Kieselguhr*.—In this the forms recognised are *Surirella*, *Gaillonella*, *Diadsmis*, *Pleurosigma*, *Synedra*, *Stephanodiscus*, *Spongolithis*, *Amphora*, *Melosira*, and *Navicula*.

2. *Scotch*.—This occurs in the island of Mull and near Aberdeen, and includes amongst other forms *Diatoma*, *Cymatopleura*, *Synedra*, *Gomphonema*, *Cocconema*, *Surirella*, *Prîmularia*, and *Rhabdonema*.

3. *Virginian*.—A stratum 18 feet thick underlies the whole city of Richmond, extending, indeed, over an indefinite and unknown area. It is so compact as to be capable of being carved into small objects, such as the bowls of tobacco pipes, but it is at the same time light and friable. It is celebrated for the number and beauty of its forms, including *Coscinodiscus*, *Dictyolampa*, *Rhabdonema*, and *Triceratum*.

4. *Australasian*.—According to Dr. J. D. Hooker¹ there is a deposit consisting chiefly of the siliceous lorice of Diatomaceæ, not less than 400 miles long and 120 miles broad, at a depth of 200 to 400 feet on the flanks of Victoria Land in 70° south latitude.

5. *Scandinavian*.—This is known locally as *bergmehl*, or mountain flour, and contains sufficient organic matter to occasion it in times of scarcity to be mixed with dough in making bread. I have seen no specimen of this, and am unable to describe its appearance, or to name any diatom occurring in it.

6. *Australian*.—This is a beautiful white fluffy powder, of which specimens came into my hands in 1894, through the kindness of the South Australian Government and others. It consists

¹ Carpenter, *The Microscope*, fourth edition, p. 311.

almost solely of the loricae of *Tetracyclus*, with occasional *Pleurosigma Surirella*, *Amphora* and *Diatoma*. There is ground for assuming that this and the Australasian deposit referred to above (which I have not seen) are the same.

The examination of eight different specimens of infusorial earth obtained from as many different sources shows important variations in composition. In no case does the silica (Si O_2) exceed 96 per cent., and it falls as low as 70 per cent., the differences being made up by moisture, organic matter, ferric oxide, and alumina. Moisture varies from 2.64 to 7.8 per cent., the average being 5.73 per cent. Organic matter ranges from 2.43 to 23.6, giving an average of 7.43 per cent. Of the professedly calcined earths, I have met with specimens containing so little as 0.4 per cent. of organic matter, but the proportion usually present is from 2.5 to 3 per cent., showing that the calcining is not perfect. Again, in some earths the iron oxide is as low as 25 per cent., and in others it is as much as 7 per cent.

Uses.—Since 1866 diatomite has been largely used in the manufacture of dynamite. This is because it is capable of absorbing a larger proportion of fluid than any other known material that is at all available to the same extent. It will absorb three times its own weight of nitro-glycerin, and then be capable of being pressed into solid blocks.

It is also used to make so-called “dry sulphuric acid.” One part of diatomite to 3 or 4 parts of oil of vitriol by weight may be mixed so as to form a mobile powder capable of being worked with iron implements and inclosed in iron drums for export without attacking the metal. I am informed that the success of this expedient is not yet fully assured.

A very important demand for diatomite is for a basis for disinfecting powder, to make which it is charged with 10 or 20 per cent. of carbolic acid or other liquid disinfectant. Such a powder is much lighter than are those with chalk or lime as a basis, and possesses the advantage of floating on the surface of any liquid upon which it is sprinkled, so that what effluvium arises must pass through the disinfectant. The crudest forms are suitable for this purpose, and one pound occupies the bulk of three or more pounds of chalk.

Another very important application of diatomite is found in the ease and perfection with which metals may be polished by its means, either in the form of powder or of a paste made with a soft paraffin. For this purpose grit of all kinds must, of course, be

carefully removed, leaving a powder of such a degree of fineness as not to scratch gold plate, yet impart a very high polish to it.

I have used diatomite associated with sodium silicate and fibrous material, such as cow-hair, for making an adherent covering for steam boilers, pipes, and pans. Loss of heat by radiation being prevented there is a corresponding economy of fuel, and the temperature of the laboratory is moderated, to the great comfort of those who work in it.

Safe makers take advantage of its non-conductivity in the construction of fire-proof chambers. This property makes it valuable also in the construction of ice houses, and, indeed, wherever it is desirable to prevent too great loss or accession of heat.

Diatomite is said to find its way even into soap, and there is no doubt of its employment in the manufacture of ultramarine and of artificial meerschäum.

Its non-conductivity is not confined to the heat wave. It effectually smothers other undulations, and is therefore equally useful for making walls sound proof, so that the inmates of a classroom in a musical seminary may practise without disturbing or being disturbed by similar students in the next chamber.

The properties of diatomite above indicated are naturally suggestive of certain uses in pharmacy. For some of these the absence of gritty particles is absolutely necessary, and freedom from organic matter is desirable for all.

As a Filtering Medium.—My attention was first attracted to diatomite for this use. Provided it were possible to obtain or prepare it free from organic matter, it seemed to possess all needful qualities for filtering liquid galenicals and certain solutions of salts and acids. Silica has powers of resistance to solvents far greater than the filtering powders in common use, viz., the carbonates of lime and magnesia, phosphate and sulphate of lime, talc, and asbestos. All these, being compounds, are susceptible of decomposition; indeed, the four first mentioned are of more than doubtful utility, and should be banished from the laboratory for purely filtering purposes. Diatomite, which may be regarded as pure silica, is absolutely indifferent to all but the strongest alkalis at a high temperature—involving a set of conditions which the pharmacist does not have to consider. There is the further advantage that it does not clog up the filtering bag to the same degree as either talc or asbestos, and filtration is consequently more rapid. The benefit of this is not confined to the manufacturer, who is thus able to accomplish more work in the same

time, but what is of greater importance, it extends to the preparation also, which must be the better for less handling and exposure. This is not secured at any sacrifice of efficiency. Note may be made of a practical point here. Diatomite does not mix readily with liquids, and should not be dusted on the inner sides of the filter bag in the expectation that it will diffuse through the liquid which is afterwards poured in; nor can it be satisfactorily mixed with the bulk of the liquid. It should be worked down in a mortar with a little of the liquid to be filtered, so as to form a smooth thin paste, which can then be mixed with more of the liquid to set the filter. This takes place almost at once, and but little of the filtrate requires to be returned. Inattention to this point has occasionally caused failure with diatomite as a filtering medium.

Small though the particles of diatomite may be, they appear to be large enough, and to present irregularity enough, to keep apart the particles of albuminoid or starchy deposit sufficiently for the passage of the still smaller particles of liquid. It is obvious that the diatomite used for filtering must be free from organic matter—a few particles of sand may be disregarded.

Dentifrices.—For making these diatomite must be free from sand and also from organic matter, which is apt to suggest a disagreeable earthy taste. It should be as white as possible, so as to exclude interference with the tint of the ingredients. These conditions secured, it may with advantage take the place of ground pumice and cuttlefish bone in all cases, and of precipitated chalk in pastes and powders, which contain other alkaline bodies, such as bicarbonate of soda and borax. If no alkali is present, or if diatomite alone is considered too light, some chalk may be retained in a powder dentifrice with benefit. Diatomite properly refined is not gritty between the teeth, and polishes without scratching the enamel. Bulk for bulk it is half the weight of the lightest precipitated chalk. The formulæ appended—

Diatomite Tooth Powder.

Diatomite	1 oz.
Creta Præcip.	1 oz.
P. Sapo. Alb.	1 oz.
Otto Rosæ	ʒij.
Ol. Caryoph.	ʒj.
Ess. Menth. Pip.	ʒv.
Sacch. Lact.	ʒj.

Diatomite Tooth Paste.

Diatomite 1½ ozs.
Alum. Ust. . . . .	. ½ oz.
P. Myrrhæ . . . . .	. ¼ oz.
Ol. Caryoph. . . . .	. m.vj.
Glycerin . . . . .	. ½ oz.
Ext. Cocci Liq. . . . .	. q.s.
M.S.A.	

—are merely suggestions as to the proportions in which diatomite may be used in dentifrices, and are of course susceptible of an infinity of variation, according to taste and experience.

Dusting Powders.—By virtue of its enormous and unequalled absorbent property diatomite is unrivalled as a dusting-powder basis. It must be the very purest that can be produced, and when absolutely free from organic matter and grit is more smooth and less irritating than any other powder. Unlike vegetable powders it does not contribute to decomposition of the exudation, but keeps sweet for a long time, and may, of course, be associated with antiseptics with equal facility and greater advantage. Smoothness is imparted by the addition of boracic acid in very fine powder. Oxide of zinc, kaolin, talc, or Fuller's earth may be added according to circumstances and the object aimed at, as also such antiseptics as salicylic acid, iodoform, thymol, etc. Diatomite as a polisher of metals has already been referred to, and it only remains to say of it in this connection that it is obtainable of all degrees of fineness, suitable for fire irons and fenders at one end of the scale and for the finest gold plate at the other.

In Dispensing.—The last suggestion I have to make relative to the use of diatomite in pharmacy is perhaps more debateable than any of the preceding. I mean as a diluent for hygroscopic powders, such as enonymin when made by the Pharmacopeia process. However carefully this may be prepared according to the official directions, it presents difficulties which are more or less great with different batches of the drug. Being absolutely inert and insoluble in the stomach juices, diatomite cannot react on the drug as chemical powders, like magnesia may, and the mixture is much more easily reduced to powder than when sugar of milk is used; it also remains pulverulent. On the other hand, the question arises as to how far it is advisable to introduce silica however finely divided into the stomach. The quantity at most is a few grains, and may be less than one grain, and when it is remembered that at times of scarcity or famine the Norwegian peasantry have been

compelled to eat ounces and even pounds in one week, the doubt is deprived of much of its significance. Further, whole-meal bread is recommended and largely consumed for the wholesome action of the siliceous particles (much coarser than diatomite) in the grain husk, on the intestinal canal, so that it would seem as if only beneficial effects would be produced by the minute proportion in a dose of euonymin or similar remedy whether given in the form of a powder or of a tablet. The binding power of diatomite under pressure suggests its use in the last-mentioned form for drugs which compress with difficulty.

Mr. Moss was able to submit a specimen of Australian diatomite in the natural condition as it occurs at Talbot, Victoria, and at Cooma, in New South Wales. They are of different degrees of hardness, but not so hard as the Virginian kind. There were also specimens from Llyn cwm Bychan, in Wales, which are softer still and darker in colour, and a most interesting specimen from the Government Geologist of South Australia, who labels it diatomaceous rock from Port Darwin. The piece is very hard and rocky, and can with difficulty be worn by scraping it with a knife, and it illustrates in a marked manner how sharp the line of demarcation may be between the white unsullied rock and the same rock stained by infiltration of some dark impure liquid.

THE PRESIDENT, in inviting discussion, said Mr. Moss told them that a diatom was a plant, which was no doubt true, though in his early days it was termed an animal. It was just on the borderland. In those days one had to go through a long and tedious process to obtain any quantity of diatoms for examination, and he remembered boiling many samples of guano with nitric acid, sulphuric acid, and then nitro-hydrochloric acid, and finally in sulphuric acid with the addition of a little chlorate of potash; and if any diatoms survived that treatment you might assume it was a very hardy skeleton, and would form an inert powder not likely to be easily acted upon.

Mr. E. C. C. STANFORD asked if Mr. Moss had had any experience with kieselguhr as a filtering-medium for ridding liquids of bacteria. One filter he knew was recommended as having this property, duo, he supposed, to the diatoms being small enough to prevent the passage of bacteria.

Mr. RANSOM said he had used the kieselguhr as a filtering medium and found it very excellent, the darker kinds, however, being better than the lighter, presumably because the diatoms in the latter were more broken up, or belonged to the smaller species.

Examined under the microscope they differed in size as much as from 1/40 to 1/1000 in. There was no doubt now that diatoms belonged to the algæ and had the characteristics of vegetables.

Mr. W. MARTINDALE said he did not regard diatomite as an ideal dusting-powder, owing to its harsh and sticky nature. Kaolin or talc he had found preferable, on account of their unctuous nature. It was true that diatomite had greater absorbent power, but in the chafing of stout people the chance of friction would be increased.

Mr. Moss in reply said anyone who had to do much filtering of galenical preparations must sometimes require to filter out bacteria which developed in them, as well as in organic preparations, and he had found kieselguhr most useful for that purpose. His experience coincided with Mr. Ransom's as to the efficacy of these powders; the darker ones did filter a little more readily than the whiter ones. The white Australian powders consisted almost of one variety, as stated in the paper, which was very small, whilst there was an immense number of forms of larger size to be found in the brown. He should not describe the infusorial earth as harsh or sticky, but as possessing the property of felting, which made it form fluffy flocks; it was better as a dusting powder for surfaces which were apt to have exudations than where two were rubbed together or for folds in the flesh, but in those cases a little of the infusorial earth mixed with talc or Fuller's earth improved the absorbing properties without interfering with the antifrictional character of these powders.

A vote of thanks was passed to Mr. Moss for his most useful paper.

The next paper read was a

NOTE ON EUCALYPTUS OIL.

By E. J. PARRY.

There are some fifty or more species of eucalyptus already identified in Western Australia, many of which are not found in the other parts of Australia. During a visit last year to this colony I went through most of the eucalyptus districts, going some 800 miles into the interior of the continent. I was struck with the overpowering and not altogether pleasant odour of the bruised leaves of some of these Western Australian eucalypts, and asked Mr. Elsie-Brown, the conservator of forests, if he could get me

any oil distilled from any of them. He was able to get about 60 or 70 c.c. from the leaves of *Eucalyptus loxophleba*, which he kindly sent me, an incomplete examination of which is the subject of the present note.

The tree is known locally as the York gum, no doubt on account of its being one of the most common eucalypts found in the neighbourhood of the town of York. It grows chiefly in companionship with *Eucalyptus redunca* (the wandoo), but peculiarly enough, whilst it flourishes on the eastern slopes of the Darling range, there is a thick eucalyptus forest on the western slopes, in which not a single specimen of *loxophleba* is to be seen. I have seen plenty of it, however, all through the forest districts between Albany and Perth, especially in the neighbourhood of York, Beverley, and Pingelly. It forms a fine straight tree, of 70 to 100 feet in height, with a diameter of 18 inches to 3 feet at the base. The bark is rough and dark-coloured, and the leaves, which are tapering, have a peculiar oblique venation. It grows on any soil, and its wood is very hard, almost, indeed, as hard as that of the famous jarrah (*Eucalyptus marginata*), and finds employment for all kinds of wheelwrights' work. The aborigines value it much, as it is the finest wood for making their spears with.

Unfortunately the small amount of oil at my disposal only allowed me to make a very incomplete examination, but I hope to be able to obtain a further supply of it, and to go further into the chemistry of the oil.

It has a most obnoxious and uninviting odour, and when inhaled induces violent coughing. Its specific gravity at $\frac{15.5^\circ}{15.5^\circ}$ is .8828. It is faintly dextro-rotary, about $.5^\circ$ for 100 mm. On fractionation it yielded the following results. It began to boil at 160° , rising rapidly to 168° . The fractions collected were:—

168°-171°	. . . . .	68 per cent.
171°-176°	. . . . .	14 " "
176°-182°	. . . . .	8 " "
182°-187°	. . . . .	2 " "
Residue	. . . . .	8 " "

With phosphoric acid the oil simply became syrupy. The first fraction was almost free from cineol, whereas the 8 per cent. distilling between 176° - 182° was almost entirely cineol. A determination of this body in the fractions, which was necessarily only approximate, showed that the oil contains only about 15 per cent., certainly not more than 20 per cent., of cineol. Whilst phellan-

drene was present, as identified by its nitrite, it did not form anything like the remaining 80 per cent. of the oil; I was unable to search for any other bodies except aldehydes and ketones, the presence of which was indicated by an absorption by sodium bisulphite of about 10 per cent.; and for amyl alcohol, which has been identified in traces in some specimens of oil of *Eucalyptus globulus*. I was unable to find any trace of this body, however.

I hope to be able to examine this oil further.

A vote of thanks was accorded to Mr. Parry for his useful note.

The author then read the following:—

GLUTEN FLOUR.

By VICTOR G. L. FIELDEN, M.B.

The subject of this paper suggested itself to me some time ago, when my friend Dr. Whitla asked me to roughly examine a sample of gluten flour which a diabetic patient of his was using, and about which he had suspicions. The iodine test in this sample showed abundance of starch, and microscopic examination revealed myriads of starch granules. I also washed a portion of it in muslin in a stream of water, and was astonished at the small amount of gluten I obtained. I determined, therefore, to examine at an early date several samples of this substance.

As you all know, gluten flour is used principally, if not exclusively, as a substitute for ordinary flour in making bread, cakes, etc., for persons suffering from diabetes, so that the conversion of starch into sugar in the human laboratory may be reduced to as low a point as possible. The more starchy food that is taken the greater is the production of sugar, and it behoves physicians in treating this disease to administer such a diet that, as far as possible, nourishment may be at a maximum and the production of sugar at a minimum. Saccharin can be used as a splendid substitute for sugar itself as a sweetening agent, but a substitute for the staff of life is not such an easy problem to solve. Almond, bran, and gluten in the form of cakes, bread, and biscuits are in everyday use, and it is but right to expect that those who are unfortunate enough to require these necessities should get them as nearly pure as possible, and chemists who supply the public should see that they are selling a really good article; hence my

reason for bringing the subject before a representative meeting of chemists from all parts of the kingdom. Medical men also should know what their diabetic patients are taking, and should examine occasionally the gluten flour to see that it is of good quality. My paper, therefore, will prove, I hope, interesting and instructive to members of my profession also, so that I think I am killing two birds with one stone.

Gluten is the most nutritious part of wheat flour, being equal to that of flesh meat, but its preparations are not by any means so palatable as those made from ordinary flour, therefore its manufacture in agreeable forms has become quite an industry in itself, but I need not dwell on this. The constitution of gluten, however, is such that it possesses very nutritive qualities, and as an article of diet is most useful, and crude gluten is recommended as a fodder. It is contained in many plants, but chiefly in the cereals, wheat being richest in this substance. Hard wheat contains more than soft wheat, and conditions of growth such as soil, climate, temperature, manure, and the season when sown greatly influence its amount. The best qualities of wheat contain from 10 to as much as 15 per cent., whilst inferior kinds contain 8 or 9 per cent. Kenwood states that wheat flour contains from 8 to 12 per cent. gluten, and if it contains less than 8 per cent. it is not pure wheat flour. Maize contains a good proportion, whilst barley, rye, and oats have less.

Gluten is not a definite chemical compound, but consists of three substances, which are closely allied to one another. One, vegetable fibrin, is insoluble in boiling alcohol, and two are soluble, one of which, mucin, separates on cooling, and the other, gluten or gliadin, remains in solution, but is thrown down on addition of water.

Martin has demonstrated that gluten does not naturally exist in flour, none being obtained if water at 2° C. be used to wash it. When water of a higher temperature is employed gluten is formed, probably by a ferment action on the proteids in the flour.

Gluten is soluble in alkalis. It is chiefly obtained from the waste products in the manufacture of starch; but it depends upon the process adopted for obtaining the starch how much gluten is recoverable. In one, termed the "sour" process, the starch granules are freed by a process of fermentation which goes on at the expense of the gluten, and in this there is consequently some destruction of this substance. Another process consists in treating the material with dilute solution of caustic soda, which, at least

in part, dissolves the gluten, and the starch granules are more readily set free. By this process the maximum amount of gluten can be obtained, for that remaining undissolved with the starch is separated by passing the washed starch through fine sieves, which retain the gluten, and that dissolved in the alkaline solution is recovered by precipitating with an acid.

Wheat starch may also be prepared from wheat flour by making into a dough with water and washing out the starch, the gluten being left in a fine sieve.

A process for the manufacture of maize starch (used largely in America) consists in mechanically separating the husk and germ, which contain the gluten, albuminoids, and oil, from the white starchy portion, any gluten retained in this being removed by washing the powder and straining through a fine sieve.

The old and not economical method used in obtaining potato starch by rasping or crushing the starchy material and subsequent washing need simply be mentioned.

There are several large houses in Britain which supply gluten preparations, and I obtained five samples of flour from different sources for examination. I did not attempt to make a complete analysis of each, but contented myself with assaying those portions which more intimately concerned me, viz., the gluten and the starch together with the sugar. In one sample only, by way of checking myself, I determined the amount of moisture, the most abundant constituent left, and I found that I was able to account for the composition of over 95 per cent. of the sample.

The plan I adopted for assaying the gluten was to wash 10 grammes thoroughly in a bag of close muslin (like this sample) in a stream of water until a small quantity of the washings when boiled gave no blue colour with tincture of iodine. This method I preferred, as being more thorough, to rubbing the flour into a paste in a mortar with water and transferring it to a conical glass, in which it is washed with successive quantities of water. The plastic mass I then dried in a tared dish in this water-oven until it ceased to lose weight, when it was weighed and the percentage calculated.

The starch I assayed by converting it into sugar by boiling 2 grammes of the flour with 20 c.c. of sulphuric acid and 200 c.c. water for three or four hours. Any sugar naturally occurring in the flour was consequently assayed at the same time, and, both being equally harmful to a diabetic patient, can conveniently be taken together. After boiling, the liquid was neutralised with

caustic soda and made up to a known bulk with water, and the amount of glucose determined by means of Fehling's solution, 10 c.c. of which was equivalent to 0.05 gramme of dextrose or glucose or 0.045 gramme of starch. With these figures a simple calculation gave the percentage of starch in the gluten flour.

	A.	B.	C.	D.	E.
Gluten.	76 p.c.	60 p.c.	65 p.c.	8.5 p.c.	66 p.c.
Starch and sugar.	7.6 p.c.	16.7 p.c.	13.26 p.c.	68.8 p.c.	11.63 p.c.

From the foregoing table it will be seen that, with the exception of sample D, all contained a large percentage of gluten, ranging from 60 per cent. in B to 76 per cent. in A, samples C and E containing 65 per cent. and 66 per cent. respectively. D contained only 8.5 per cent. of gluten.

With regard to the amount of starch and sugar it will be seen that A again took first place by containing the smallest amount, viz., 7.6 per cent., E came next with 11.63 per cent., then C with 13.26 per cent., and B with 16.7 per cent., whilst D, as was to be expected, contained a very large proportion, viz., 68.8 per cent.

This bad sample (D), I learn, is what is sold as crude gluten and is of American origin, and considering that wheat flour, as Kenwood states, contains from 8 to 12 per cent. of gluten, a diabetic gains nothing but rather otherwise by using such a gluten flour as sample D in preference to a good wheaten flour. Sadtler mentions that it has been found that by the process of prolonged boiling with diluted sulphuric acid only 95 per cent. of the starch is converted into dextrose, other non-reducing bodies being formed at the same time. This being so, the percentage of starch would be even higher than my results, as noted in the table, show.

As it is such a simple matter to find out the proportion of gluten by simply carefully washing the flour in a muslin bag and drying, I would suggest that all chemists who sell this article occasionally test their stock, and supply only a good and reliable gluten flour, for the feeding of a diabetic is everything in the treatment of his disease, drugs holding a very secondary place indeed. To feed him on starch is only adding fuel to the fire, which is surely and often rapidly hurrying him to his grave.

Since writing the foregoing, I have been much interested in a leader in the *British Medical Journal*, of July 16, on "The Chemistry of Diabetic Foods." In this article, a paper by Dr.

F. Kraus, jun., of Karlsbad, is mentioned, in which, they say, he "illustrates the futility of trusting to the general run of commercial articles sold as diabetic bread by a table showing the carbohydrate contents of most of those used in Germany. Of the nineteen specimens enumerated, only five contain less than 30 per cent. of carbohydrate, four are between 30 and 40 per cent., four between 40 and 50 per cent., two between 50 and 60 per cent., and four over 60 per cent., as against ordinary white wheaten bread, which contains 60 per cent." They also make the statement that they "could produce parallel examples of English diabetic bread and flour in every respect as bad as those made in Germany." A lesson that is desired to be taught is that "it is much better to allow a definite quantity—for example, two to four ounces of potato or toast, than to allow an unlimited amount of 'diabetic bread' of unknown composition."

This warning, coming independently of mine to beware of the quality of diabetic food-stuffs, increases the necessity for care, and I refer to this article so as to still further impress the warning note upon the minds of all.

In conclusion, I beg to thank Professor Letts, of Queen's College, for having kindly lent me most of the apparatus necessary for carrying out the examination of which I have described the results.

The PRESIDENT said this paper was very valuable at the present time, when so much attention was given by the medical profession to food for diabetic patients. Some years ago Dr. Pavy had a number of samples of diabetic bread and biscuit examined. He thought that they should contain at least 75 per cent. of gluten, and it was very important that such articles should not contain so much starch as 50 or 60 per cent.

Mr. COLLIER said he belonged to the hospital with which Dr. Pavy was many years associated, and was aware that gluten bread always contained a notable quantity of starch. You could not obtain gluten flour free from starch, and he always attributed that to the mode of preparation. The mere washing out of the starch with water was not sufficient, and he should like to know if Dr. Fielden had any experience of a method which had been suggested of treating the flour with a certain amount of extract of malt, which, by its diastasic action, rendered the starch soluble. A short time ago he examined a French specimen of gluten bread which had received high testimonials, and found it contained nearly 40 per cent. of starch. The general impression amongst medical men

was that gluten bread was practically free from starch, and it was very desirable that the facts should be generally known.

Dr. B. H. PAUL could confirm what had been said with regard to the almost invariable presence of a large proportion of starch in the so-called diabetic food, gluten biscuits, and such preparations. Two or three years ago he examined a large number of these preparations for a sufferer from diabetes, and there was scarcely one of them which was not found to contain such large proportions of starch as to make them delusive as diabetic food.

Mr. MARTINDALE said he had been informed by a dealer in gluten flour in London that it was impossible to get it free from starch, and also that it was invariably an imported article, being either of Swiss or French manufacture. He considered that as a pleasant change for diabetic patients bran or almond biscuits would be found very suitable.

Mr. ATKINS said the paper was of great practical importance, and the Conference were greatly indebted to the writer. He was amazed at the large percentage of starch present in the gluten bread, especially in sample D. It seemed to him that a very cruel course was unconsciously being pursued in the sale of this bread; patients were compelled to eat this most obnoxious form of bread under medical advice, and surely there ought to be some means by which an honest article could be supplied to them, and he trusted that that would be one of the results which would follow from the reading of the paper.

Mr. NAYLOR said gluten was extremely difficult to manipulate, and he should like to suggest that that was possibly one reason why gluten flour always contained a proportion of starchy matter, though it did not account for the large proportion that had been disclosed.

Dr. FIELDEN thanked the Conference for the way the paper was received, and, in reply to Mr. Collier, said he had had no experience with the diastase method of preparing gluten bread. His experience had been confined to the flour. Every speaker had commented on the fact that it was not possible to get samples free from starch. His object had been to get to know the proportion present and the relative values. The samples had been obtained from entirely different sources, but he could not identify them except D, which was American. Almond and bran meal was an excellent substitute for gluten flour, but it was out of the scope of this paper. Like Mr. Atkins, he had been amazed at the amount of starch he found in the flours.

The PRESIDENT, in proposing a vote of thanks to Dr. Fielden, said there were differences of opinion about gluten bread, but he thought everybody would agree that it would require a good deal of eating.

The next paper read was on :—

THYROGLANDIN.

By E. C. C. STANFORD, F.I.C., F.C.S.

There is a pretty general opinion amongst medical practitioners that the various known preparations obtained from the thyroid gland of the sheep leave something to be desired in uniformity of action and in efficiency as a substitute for the raw gland. The absolute cure of a fatal, though fortunately rare, disease, myxœdema, and the importance of its use in commoner complaints, such as obesity and psoriasis, have brought the thyroid gland into prominent notice and into daily extending use. This is shown by the fact that the new British Pharmacopœia has two preparations of it. One, *thyroideum siccum*, is simply the gland dried at a temperature of 90° to 100° F., and the other, *liquor thyroidei*, a glycerin and phenolised cold water extract. There are a number of other preparations in the market, the most important of which is thyroiodin, discovered by Baumann. Probably the most efficient, as well as the most largely used, is the dried gland. The objection to the use of this form is that it is just as dangerous as the raw gland, in that it may introduce into the system bacteria or other matters of foreign origin, which may give rise to disagreeable symptoms, and, indeed, these have been complained of and are already known as thyroiodism. The objection to the glycerin extract is that it does not dissolve out the thyroiodin, and the objection to the use of the thyroiodin alone is that, although perhaps the most active principle, it does not represent all the active constituents of the gland.

Thyroiodin is obtained in destroying the greater part of the gland by boiling for thirty hours in 10 per cent. sulphuric acid (Bayer's Patent, No. 12295, 1895), or by boiling it in 3 per cent. caustic soda solution, and precipitating the thyroiodin by an acid (Bayer's Patent, No. 20827, 1895), or by digesting the gland with pepsin, or by heating it in a close vessel at 180° C. with water (Bayer's Patent, No. 9576, 1896). In each case the gland is

destroyed and the thyriodin only extracted. The thyriodin is a stable compound and not easily decomposed. It exists, according to Bayer, in small proportion, about 1 in 333 or 3 per mille. The thyroid gland contains two important principles, each containing iodine, iodo-globulin, and thyriodin. The iodo-globulin in all the above methods is destroyed. I find it can easily be extracted by cold water, and that this solution can be evaporated at 212° F. without in any way impairing its activity. This substance amounts to about 17 per cent. of the raw gland, and is quite active alone. It contains iodine.

The thyriodin, which is more active, but existing in smaller quantity, can then be extracted from the residual gland, after maceration in cold water, by boiling it with weak caustic soda solution for an hour, and precipitating by an acid. The process I adopt then is as follows: The thyroid glands, freed from fat, are first minced, macerated in four to five times their weight of cold water (using ice, if necessary, in summer, to keep down the temperature to 50° F.) for twenty-four hours, and this maceration is repeated. The solutions are filtered off and evaporated to dryness at a temperature not exceeding 212° F. The extract is powdered, and represents the iodo-globulin and a small proportion of saline matter. The residue from the cold water maceration is boiled for one hour with a 1 per cent. solution of caustic soda in the proportion of 1 per cent. of caustic soda to the original gland. This solution is allowed to cool, to deposit the fat, and filtered off. The solution is then carefully neutralised with hydrochloric acid and evaporated to dryness at 212° F. The residue, which contains all the thyriodin, is then powdered and mixed with the iodo-globulin obtained in the first process. The resulting powder is the new preparation to which the name of thyroglandin has been given. The last evaporate may be digested with petroleum spirit to remove traces of fat, but in all ordinary cases the amount is so small that this is unnecessary.

It may be asked why I do not separate the thyriodin by acid precipitation. The reason is that the precipitation is never complete on account of its partial solubility in the saline mother liquor. Even in Baumann's process of boiling with 10 per cent. sulphuric acid only a portion is thrown down; much remains in the acid solution, and after neutralising it with soda and evaporating the sodium sulphate liquor it continues to deposit even down to crystallisation, and cannot be entirely removed. In four experiments with this process I found an average yield of 3.34 per cent.

thyroidin, of which 0.55 per cent. was precipitated and 2.99 per cent. recovered from the mother liquor.

My experience with acid precipitation from soda solutions is that the thyroidin is even more soluble and difficult to remove. So I retain it all by evaporation, with the addition of a small quantity of sodium chloride. This addition makes it a palatable preparation, and consequently no objection on the part of the patient is made to taking it in powder. The result gives about 8 per cent. on the gland, so that the usual yield of thyroglandin is about 25 per cent. The gland yields 29 to 30 per cent. of dry matter, so that the dose is rather less than that given in the B.P., which is 3 to 10 grains. The weight of the thyroid gland differs enormously; I have found them vary from 24.2 grains to 136 grains, but the most usual weight is 33.3 grains, or about 3 glands to 100 grains, so that 8.6 grains thyroglandin = 1 gland. The dose, therefore, if half a gland is taken is 4.3 grains, a quantity not too large for ordinary patients to take in powder. Of course it may be compressed into pellets if desired. By one gland I mean one lobe, of which there are two in the animal.

I claim that this preparation does really represent the activity of the raw gland without its disadvantages and dangers, and that it contains the active principles in the form and proportion in which these exist in the raw gland. Considering the raw material used, this preparation is remarkably uniform. This is proved by the cases given by Dr. McLennan, of Glasgow University, in the *British Medical Journal*, July 9, 1898, and by several other observers, whose reports have not yet been published. No unpleasant symptoms were observed in any of the patients who took this preparation.

An outline of the process was given in Dr. McLennan's paper, and it has been criticised in the *British Medical Journal*, July 16, 1898, by Dr. Hutcheson, who naturally prefers a process of his own. This consists in macerating the glands in cold 1 per cent. caustic soda solution, and precipitating the colloids by acetic acid. This would be a convenient method if it were effectual; but the caustic soda in the cold does not dissolve out the thyriodin, for on boiling the residue with 10 per cent. sulphuric acid much thyriodin can be extracted. Then the iodo-globulin, which is easily extracted by cold water, is altered by caustic soda, so that the colloid precipitated by acetic acid is not the same as the iodo-globulin dissolved, as might be expected, with such an easily altered body. The precipitation is not complete, for the acetic acid

mother liquor, if neutralised and evaporated down, still contains a considerable proportion of the iodine.

My results in this process gave precipitated colloids, 6.67 per cent.

Thyroidin in residue (15.25 per cent., and very hygroscopic), extracted by boiling in 10 per cent. sulphuric acid, 0.73 per cent.

In another German patent the glands are extracted by a $\frac{3}{4}$ per cent. solution of sodium chloride and the solution precipitated by tannic acid, but here a foreign body is introduced into the colloid. The precipitation is not complete, the mother liquor contains iodine, and the residual gland contains thyroidin.

My results with this process gave:—

Colloid tannin precipitate, 16.94 per cent.

Thyroidin in residual gland, exhausted by boiling in 10 per cent. sulphuric acid, 0.234 per cent.

Here, again, the active principles are not all exhausted, as the sodium chloride does not dissolve out the thyroidin.

The PRESIDENT said this was a subject which Mr. Stanford had made his own, having been working at it for some time, and he had evidently, since last year, succeeded in meeting some of the difficulties which presented themselves, and producing a very excellent preparation.

Dr. MCWALTER said Mr. Stanford was such an authority on this subject that he only ventured with diffidence on any criticisms; but it seemed to him that the preparations of the thyroid gland had long been a reproach to pharmacy, inasmuch as very few at all represented the active principle. The first difficulty was to know what really was the active principle, but as far as he could make out it was generally admitted that there were two, and possibly three—viz., thyroidin, a metabolic product called thyro-proteid, and a third, described by Mr. Victor Horsley, which was of the nature of an internal secretion, the approximate chemical character of which had not yet been determined. He did not think sufficient stress was laid on the importance of employing the gland while still warm from the animal, because *post-mortem* changes took place with great rapidity. No doubt Mr. Stanford used them fairly fresh, but he did not think he was sufficiently definite on that point; they ought to be used, if possible, within thirty minutes of removal. With regard to the glycerin process, though Mr. Stanford did not approve of it, he understood that since last

year Dr. Murray of Newcastle-on-Tyne, who was then quoted in favour of dried preparations, had expressed himself as a convert to the use of glycerin, and even claimed the new pharmaceutical preparation as his own. Although Mr. Stanford had quoted Dr. McLennan, who was an undoubted authority, in favour of his preparation, he thought further experience was desirable before it could be accepted as being entirely satisfactory. They were all, however, much indebted to Mr. Stanford for his very valuable paper.

Mr. SIEBOLD asked for information about the relative proportion of iodo globulin and iodothyrim in the preparation Mr. Stanford had made, and the proportion of iodine in each of these two constituents.

Mr. MARTINDALE asked if it had really been decided that the efficacy of the gland was due to the iodo compounds found in it. If it were chiefly due to the iodine, Mr. Stanford could obtain that body much more cheaply from other sources. The use of the iodothyroidin preparation had not been carried far in London, where a dried preparation of the gland, and in some cases the glycerin extract, was preferred, though the latter was not much demanded, because it did not keep well. The pharmaceutical preparation made by exhausting the gland with petroleum spirit kept reasonably well; but there was the danger that the gland, unless quickly dried and freed from fat, was apt to undergo decomposition. These preparations of Mr. Stanford were not unpleasant in odour, but there was a trace of a pepsin-like smell which a fastidious patient might object to.

Mr. KELLY said if post-mortem changes took place in the gland the patient might be swallowing ptomaines instead of the thyroid gland; he thought, therefore, that some test for ptomaines should be included in the Pharmacopœia process, so as to provide for cases where decomposition might have commenced.

Mr. BALL asked what was the real difference between the production obtained by Dr. Hutcheson's method and by Dr. McLennan's. He rather gathered the difference was that in Dr. Hutcheson's process the gland was not so completely exhausted.

Mr. STANFORD, in reply, said Mr. Ball was right; Dr. Hutcheson's preparation did not represent the gland, because it was not all exhausted. He could not go into the question of the medical action of the thyroid gland, for anyone who would go into the literature of the subject would find not only that it was very voluminous, but that opinions varied very greatly as to what was the active principle. He only claimed for this process that it was the

first attempt to get a good chemical process, giving a product which had no decomposing matter in it. All the others, except the thyroiodin, were liable to be contaminated by any disagreeable substances which might be contained in the raw gland. The two tubes he had shown would partly answer Dr. Siebold's question, but he could not give the exact iodine contents then, though he hoped to add this information later. With regard to glycerin preparations he thought that they were the ones which were generally complained of as producing unpleasant symptoms.

Mr. STANFORD was warmly thanked for his interesting and practical paper.

In the absence of the author the following paper was read by Mr. Naylor:—

A QUICK POLARIMETRIC METHOD FOR THE DETERMINATION OF STROPHANTHIN IN THE B.P. EXTRACT AND TINCTURE.

By EWDIN DOWZARD, F.C.S.

The following method will be found useful as a means of approximately determining the amount of strophanthin in the B.P. tincture and extract:—

100 c.c. of tincture are evaporated down to about 20 c.c. on a water bath, 2 c.c. of a solution of basic acetate of lead are then added, the mixture heated for a few minutes, and filtered, the precipitate being washed twice with warm water. The filtrate and washings are evaporated to about 10 c.c. and made up to exactly 20 c.c. with water, a portion of which is passed through a dry filter. The optical rotation of the filtrate is then taken in a 200 mm. tube, using an instrument of the Laurent half-shadow type.

One minute is equivalent to .03 gramme strophanthin per 100 c.c. of the liquid examined.

Example:—

100 c.c. of the 1885 tincture were treated as above, rotation = + 0° 30'.

$\therefore \frac{.03 \times 30}{5} = 0.18$ gramme strophanthin in 100 c.c. tincture.

It is necessary, of course, to divide the rotation by five, as the liquid is five times stronger than the original tincture.

In the case of the extract, the estimation must be made before the reduction with milk sugar.

1 gramme of extract is dissolved in 5 c.c. warm water. 2 c.c. solution of basic acetate of lead are then added, the mixture heated for a few minutes and filtered, the precipitate is washed with warm water until the filtrate and washings measure 20 c.c. The rotation is then observed, and the amount of strophanthin calculated therefrom as in the tincture.

The PRESIDENT said this was a very interesting as well as short paper, the method of examination being one which could no doubt be applied to other things, as the polarimeter gave its indications rapidly. He hoped the matter would be followed up.

A vote of thanks was accorded to Mr. Dowzard for his very practical note.

The Conference then adjourned for luncheon.

On resuming the following paper was read by Mr. Naylor—

THE GREEN EXTRACTS OF THE PHARMACOPŒIA.

By W. A. H. NAYLOR, F.I.C., AND JOHN J. BRYANT.

The results embodied in this paper are intended to supply data that may assist in framing a reply to question No. 48 of the Conference Blue List, the exact wording of which is as follows :—

"It is obvious that green extract of belladonna, extract of henbane, and extract of stramonium should be standardised. A simple process of assay and definite proposals for standard strengths are desirable."

No mention will be made of extract stramonium, as we have been unable to obtain samples made from the juice of the plant. It may be surmised that the Committee of Revision of the Pharmacopœia refrained from fixing the amount of alkaloidal content until pharmacists could show that what was desirable was also practicable. In the sixteenth edition of Squire's "Companion" the alkaloidal strength of ten samples of the extract of belladonna are given. No indication of the method by which they were assayed is afforded.

The process we have adopted may now be described :—

From 2 to 5 gm. of the extract is weighed into a wide mouth flask (for convenience an Erlenmyer flask is recommended), 25 c.c. of 90 per cent. alcohol is added, and the flask with its contents

heated on a water bath under an inverted condenser or other arrangement that prevents loss of alcohol and provides facilities for exhaustion. This operation is twice repeated with two more quantities of 25 c.c. of 90 per cent. alcohol. After each operation the alcoholic solution in the flask is allowed to become cold, and filtered, and the filtrates are united.

To make sure that extraction of the alkaloidal content is complete, the residue in the flask is warmed with a 5 per cent. solution of hydrochloric acid and filtered. The filtrate is then tested with solution of iodine in potassium iodide. We have found that three extractions with alcohol are sufficient for the purpose.

To the alcoholic solution of the alkaloid an equal volume (75 c.c.) of a 5 per cent. solution of the hydrochloric acid of the Pharmacopœia is added, and the mixture shaken up three times successively with 15 c.c. chloroform. After separation and rejection of the chloroformic liquids the acid solution is rendered distinctly alkaline by the addition of solution of ammonium hydroxide and again shaken up three times successively with 10 c.c. chloroform. The chloroformic solutions, after withdrawal, are mixed and evaporated, and the residue dried over a water bath until it ceases to lose weight. The dry alkaloidal residue is titrated as the Pharmacopœia directs in the final stage of the process for determining the proportion of alkaloid as given under *extractum belladonnæ liquidum*.

The chloroformic separations take place quicker and cleaner than is the case in the Pharmacopœia process for liquid extract of belladonna.

It may be noted that the difference between the amount of alkaloid obtained by weighing and that indicated by subsequent titration is less than 0.01 gm.

The following table gives the exact results obtained from weighing and titration, and shows by difference the amount of impurity in the alkaloidal residue. Two estimations of each sample of extract are given. In the table are included the published analysis, by John Barclay, B.Sc., of the green extracts of belladonna¹ met with in commerce, and also those given in the seventeenth edition of *Squire's Companion* :—

One great drawback to Barclay's process is, it is unnecessarily complex, inasmuch as it effects the solution of mucilaginous substances which in a subsequent operation have to be precipitated and rejected.

¹ *Pharm. Journ.* [3] xxiii., pp. 740.

Green Extract of Belladonna.

No.	Amount taken.	Weight of alkaloid.	N/10 acid H Cl consumed.	Yield of alkaloid by titration.	Amount of impurity.	Per cent. of alkaloid by weighing.	Per cent. of alkaloid by titration.	Barelay's		Squire's Comparison.
								Per cent. of alkaloid by weighing.	Per cent. of alkaloid by titration.	
1	4.824	0.079	2.5	0.07175	0.00725	1.637	1.487	1.32	1.24	0.94
	4.070	0.070	2.1	0.06027	0.00973	1.719	1.480			
2	5.005	0.085	2.75	0.078925	0.006075	1.698	1.576	1.37	1.11	1.17
	3.672	0.0645	2.0	0.0574	0.0071	1.756	1.563			
3	3.858	0.027	.9	0.02583	0.00117	0.699	0.669	1.23	1.04	1.11
	4.879	0.010	1.15	0.033005	0.006995	0.819	0.676			
4	4.488	0.035	1.1	0.03157	0.00343	0.7798	0.7034	1.00	0.97	.73
	5.534	0.048	1.4	0.04018	0.00782	0.8673	0.726			
5	6.142	0.118	3.8	0.10906	0.00891	1.921	1.775	1.02	0.97	1.26
	4.720	0.092	2.9	0.08323	0.00877	1.949	1.763			
6	3.682	0.028	0.7	0.02009	0.00791	0.760	0.545	0.97	0.87	1.22
	3.941	0.030	0.75	0.021525	0.008475	0.761	0.546			
7	6.925	0.092	2.9	0.08323	0.00877	1.928	1.201	0.87	0.77	1.16
	4.011	0.056	1.7	0.04879	0.00721	1.396	1.216			
8	4.038	0.037	1.0	0.0287	0.0083	0.9162	0.7107			1.21
	5.011	0.041	1.25	0.03587	0.005125	0.8181	0.7159			
9	5.010	0.053	1.6	0.04592	0.00708	1.057	0.9165			1.21 - 1.884
	4.102	0.044	1.3	0.03731	0.00669	1.072	0.9095			
10	4.320	0.052	1.7	0.04879	0.00821	1.2037	1.1293			1.17 - 1.892
	5.050	0.062	2.0	0.0574	0.0046	1.2277	1.1168			
Averages						1.2142	1.0742	1.11	1.00	1.118

The extracts of henbane were assayed by the process described and adapted for extract of belladonna, and the results obtained are given in the subjoined table. Two assays of each extract are given :—

We desire to direct attention to the fact that the extracts referred to in both the tables were supplied by growers of belladonna and henbane, who are also makers of the corresponding green extracts, or by makers (not growers) on a larger scale. They are all made from herbs grown in England in localities for the most part far removed from each other. They may be accepted, therefore, as representative samples, that is, as representing the extracts supplied to dispensing pharmacists by wholesale firms of acknowledged repute. There is no reasonable ground to hope that an examination of samples taken from the dispensing

counter of chemists throughout the country would show a much nearer approach to uniformity of strength. They suffice to confirm the observations of others as to the great variation in alkaloidal strength that exists in extract of belladonna, and they also show that the variation is proportionately great in the case of extract of henbane. It would be an advantage if growers of these herbs who also make these extracts would supply to the British Pharmaceutical Conference data bearing upon the influence of soil and seasons in respect of yield of alkaloid.

No.	Amount taken.	Weight of alkaloid.	N/10 acid H Cl consumed.	Yield of alkaloid by titration.	Amount of impurity.	Per cent. of alkaloid by weighing.	Per cent. of alkaloid by titration.
1	3.715	0.010	0.3	0.00861	0.00139	0.269	0.231
	6.333	0.023	0.5	0.01435	0.00865	0.363	0.226
2	3.884	0.015	0.3	0.00861	0.00639	0.386	0.221
	5.130	0.020	0.4	0.01148	0.00852	0.368	0.2114
3	4.530	0.018	0.5	0.01435	0.00665	0.3973	0.316
	5.782	0.025	0.65	0.018655	0.006345	0.4323	0.3226
4	5.370	0.027	0.8	0.02296	0.00404	0.5027	0.4275
	4.410	0.022	0.65	0.018655	0.003345	0.4989	0.423
5	4.942	0.011	0.25	0.007175	0.003825	0.2225	0.1451
	3.003	0.010	0.15	0.004305	0.005695	0.333	0.1430
6	4.031	0.014	0.3	0.00861	0.00539	0.3473	0.2135
	2.687	0.009	0.2	0.00574	0.00326	0.3349	0.2136
7	7.045	0.008	0.5	0.01435	0.00365	0.2555	0.2036
	4.225	0.011	0.3	0.00861	0.00239	0.2603	0.2037
8	6.291	0.015	0.45	0.012915	0.002085	0.2384	0.2051
	5.652	0.014	0.4	0.01148	0.00252	0.2476	0.2031
9	4.122	0.013	0.3	0.00861	0.00439	0.3153	0.2088
	5.500	0.019	0.4	0.01148	0.00752	0.3454	0.2087
Averages						0.3303	0.21038

The extracts are widely used, and so long as they find a place in the British Pharmacopœia it is desirable to fix for them a standard of alkaloidal strength. The experience of one of us proves that there is no difficulty in making green extract of belladonna to contain 1 to 1.25 per cent. of alkaloid. Why, then, not fix the strength of the extract at 1 per cent. of alkaloid, using, when necessary, sugar of milk as a diluent, and so bring it into line with the official alcoholic extract? For the extract of henbane we suggest 0.2 per cent. of alkaloids.¹

¹ P.S.—We desire to point out that immediately prior to the Conference sessions we learnt that the subject of the green extracts had received the

The PRESIDENT said Mr. Naylor had, in a very few words, given the result of some useful work. With his accustomed modesty he always attributed less importance to his work than it deserved, but when they came to study the paper they would see that it had involved very careful work. This paper might be taken to be not only reliable, but also representative of work still to be accomplished.

Mr. MARTINDALE thought the green extracts were not up to date. They were largely in demand, but the preparation of them entailed a good deal of pressure of work at a limited season that would be very much better done if the extracts were prepared from carefully dried plants. He did not think there was any civilised country that used such preparations as were used in Great Britain. For his part he should prefer to have the plants carefully dried and alcoholic preparations made from them. The prices varied with the season in which they were collected; if they were collected in a wet season the amount of alkaloid in the juice would vary, and the extracts would also vary.

Mr. J. C. UMNEY asked whether Mr. Naylor had made any experiments as to the proportion of alkaloid got from the same district in the case of belladonna at different seasons. Making experiments on a large scale he noticed that the extracts at the end of July or the beginning of August were better than those made early in the season. He made no experiment on their alkaloidal value.

Mr. FARR said in conjunction with Mr. Wright he had examined a number of green extracts. They had examined them for the mucilaginous as well as the alkaloidal constituents, and found they contained a very large proportion of inert matter. After working on the subject for a month or two they came to the conclusion that if you wished to get a really active preparation it was necessary to work upon the dry material, and make a more or less alcoholic preparation. He was pleased to hear Mr. Naylor advocate the standardising of these preparations, as he thought he was not always in favour of it.

Mr. NAYLOR said they had not considered in the short note the advisability of using dry material. They had simply hoped that what they had there given would be some little contribution on

attention of Messrs. Farr and Wright (*Pharm. Journ.*, series iv. vol. v. pp. 517). From the analysis of six samples of each extract they obtained an average alkaloidal value of 0.98 per cent. for extract of belladonna, and 0.15 per cent. for extract of henbane.

the question. In reply to Mr. Umney he must say that he and his colleague had not considered the question he referred to, but he did think that they were able, to a very considerable extent, to determine whether they should have an extract which should contain a fair proportion of alkaloids, or one which should contain a much smaller proportion. Of course, if they took the green herb, which was very stalky, and, especially if it contained a lot of the thick stalk, they would have an extract which would contain more mucilaginous matter, but less alkaloid. If they were careful in the choice of the green herb and took the leafy portion, then, independently of soil and season, they would be able to obtain an extract which would contain not less in the case of belladonna than 1 per cent. It was quite clear that there was a great variation in the percentage yielded by these extracts, and the only sound conclusion they could come to was that, so long as they were retained in the Pharmacopœia, they should be standardised.

The PRESIDENT, in putting the vote of thanks, reminded the meeting that experience in regard to cocaine showed that by drying the leaves they lost cocaine; hence they had returned to the use of fresh leaves by manufacturing crude alkaloid where the plants grew. Probably, if they were to have green extracts made from dried leaves experience would possibly be the same, and it was worth remembering that their knowledge of these extracts was obtained from the use of the fresh plants. It was not always safe to depart from knowledge resulting from experience.

The next communication was on:—

ALGINOID IRON, AND SOME OTHER ALGINOIDS.

By E. C. C. STANFORD, F.I.C., F.C.S.

The property of passing through the stomach unchanged is possessed by few if any medicines; hence where this is desired, it is usually necessary to cover the medicament with such a body as keratin, on which the stomach has no action. A complete series of therapeutic compounds having this general property would be new to medicine, would probably give rise to new developments, and add considerably to the physicians' weapons for attacking disease. Such a series appear to be presented in the alginates. As far as has been ascertained, alginic acid and its insoluble medicinal

salts, iron, zinc, mercury, bismuth, lead, silver, antimony, arsenic, etc., are unacted on by the gastric digestion, and pass the stomach unchanged. Hence the action of these metals may be expected to present some differences or variations of the ordinary effects when presented in this form, and for a distinctive and expressive name I call these "Alginoids."

I have represented the chemical formula of alginic acid as $C_{76}H_{80}N_2O_{22}$. It is a strong acid evolving carbonic acid from the alkaline carbonates in the cold. However it is assimilated it is known to be a nutritious food. The soluble alginates are those of the alkaline metals and of magnesium. The insoluble salts are of the other alkaline earths and of the heavy metals.

Alginoid Iron or Ferric Alginate.—Ferrous salts are not precipitated by sodium alginate, the ferric salt is obtained by decomposing ferric chloride with sodium alginate, both in solution. A gelatinous brown precipitate is obtained. When dry it forms a tasteless insoluble brown powder, having a composition leading to the formula $C_{76}H_{77}Fe_3N_2O_{22}$. It contains 10.97 per cent. of Fe.

It is soluble in ammonia, forming a deep reddish-brown solution, which on evaporation becomes insoluble in water, so that the alginoid iron can be administered in a liquid form.

The dry powder has, however, been mostly administered, and in all cases of anæmia and chlorosis, even where gastric ulceration was present, it has been well borne, and showed a sedative action by arresting vomiting and sickness. It can be employed, therefore, when other preparations of iron would not be tolerated. Being quite tasteless it is readily taken by children. It has no astringent effect on the bowels, and does not produce constipation; on the contrary, the effects are slightly laxative. It is given in doses from 2 to 15 grains. Some physicians have found the former dose quite effective.

I shall only now shortly refer to some other alginoids, specimens of which are on the table. The therapeutic trials of these are not yet complete, and this is therefore only a preliminary notice.

Alginoid Bismuth or Bismuth Alginate.—This compound is a yellow powder containing 32 per cent. of Bi. It is prepared by decomposing bismuth nitrate by sodium alginate, both in solution. It is soluble in ammonia, remaining soluble on evaporation, and this gives us another form of liquor bismuthi, miscible with water.

Alginoid Mercury or Mercurous Alginate is obtained by decomposing mercurous nitrate with sodium alginate, both in solution. This compound presents a grey powder containing 33 per cent. of

Hg, or about the same as the officinal grey powder and blue pill. It is blackened by ammonia. It is expected that this preparation will not derange the stomach and digestion.

Mercuric Alginate.—Mercuric chloride in solution is not precipitated by sodium alginate, a distinction from albumin. But mercuric nitrate in solution is precipitated, and the mercuric alginate so obtained is a whitish grey powder, soluble in ammonia. This solution does not affect steel instruments.

Alginoid Antimony or Antimony Alginate is a white powder containing 4.5 per cent of Sb. It is prepared by precipitating antimony chloride with sodium alginate, both in solution. It is soluble in ammonia, giving therefore another solution of antimony, miscible with water. The residue on evaporation remains soluble in water.

Alginoid Arsenic is a white powder prepared by precipitating arsenic chloride with sodium alginate. It is soluble in ammonia, affording another liq. arsenici, which may have some advantages. The residue on evaporation remains soluble in water.

Alginoid Alkaloids.—All the alkaloids combine with alginic acid, and the salts are soluble in water—for instance, we may have another liquor strychninae alginatis which certainly will not crystallise, all the alginates being gelatinous.

Alginoid Magnesia.—It is remarkable that this is a soluble salt; the two insoluble compounds, alginic acid and magnesia, combine in the presence of water to form a clear solution. If magnesium carbonate be used, carbonic acid is evolved. The formula is $Mg_5(C_{76}H_{77}N_3O_{22})_2$. It contains 4.2 per cent. of Mg. In a 40 per cent. solution it makes a good gum for adhesive purposes.

All the alginoid solutions keep perfectly.

I hope to refer more fully to these and to some other alginoids in a future communication. However, I have sufficiently indicated the character of these preparations to lead to some of those valuable suggestions which are so often obtained from the members of this Conference.

The PRESIDENT said Mr. Stanford had introduced a new class of substances which appeared to possess certain advantages. He would first ask if these solutions kept well; if they did, some of them would be very useful. They all knew the difficulty in coating certain drugs in such a manner as to prevent their action until they had passed from the stomach into the intestines, and if this

class of preparations could be relied upon as obviating the necessity for this operation they would no doubt prove valuable.

Mr. BIRD asked if the magnesium alginate could be used for emulsifying purposes. Some years ago Mr. Stanford sent him some sodium alginate, which he tried for that purpose, but found it too gelatinous. These compounds were very interesting, and the iron alginoids in particular appeared likely to be very useful.

Mr. MARTINDALE thought these preparations offered a means of administering metallic compounds which would be of great service. He might refer especially to the bismuth compounds, which might in many diseases prove valuable. The same with regard to arsenic. It could hardly be borne by the stomach in large doses, but was chiefly absorbed in the bowels. The ferric alginate might also prove of some service, as the big doses required in some cases of chlorosis were very irritating to the stomach, and could not be borne by some patients. The taste was not disagreeable, and if it could be diluted with wine without precipitation he thought it would be an agreeable medicine for children. The mercurous alginate also might be very useful in certain cases. He should like to know if the alginate compounds were as useful for coating pills as keratin, and also if the antimony alginate would keep stable without the development of fungi. He feared the liquid preparation of bismuth was too weak to act as bismuth, but merely as a sedative.

The PRESIDENT asked if iron alginate mixed with other medicines without decomposition, as one of the reasons why dialysed iron had failed was because it was so readily decomposed; incompatible, in fact, with almost everything.

Mr. STANFORD, in reply, said one of the difficulties about the introduction of the sodium alginate was its extraordinary viscosity; a 2 per cent. solution was an extremely viscous fluid. The alginate of magnesium was the only one which would be at all likely to be used for pill coating, and he did not know that he should recommend even that for that purpose. The bismuth preparation was only brought to show that another solution of that metal could be produced; no doubt it would be too weak to be of much use. The alginate of iron, however, had been thoroughly tried, and the origin of it was rather singular. There was a girl who had been discharged from the Glasgow Royal Infirmary as incurable, suffering from acute anæmia and gastric ulcer. He got the local doctor to give her this preparation, and much to the astonishment of the physician of the Infirmary, who had pronounced her incurable,

within about a month she was perfectly cured. He believed they all kept perfectly well, and did not give rise to any growth.

Mr. MARTINDALE explained that Dr. Ringer had found extremely small quantities of calcium salt had a powerful effect upon the heart of a frog, so that such salts could not be so inert as was generally supposed. Even the amount of lime in tap-water affected the frog's heart.

A vote of thanks was passed to Mr. Stanford for his very interesting communication.

The following two papers were then read, the first by Mr. J. C. UMNEY, and the second by Mr. PARRY, in the absence of the author.

A NEW CONSTITUENT OF LEMON OIL.

By JOHN C. UMNEY, Ph.C., F.C.S., AND R. S. SWINTON.

From the very time that citral was first stated to be the odorous constituent of lemon oil, various theories have been put forward to account for the difference in both taste and odour between a natural lemon oil and a mixture of the terpene of lemon oil with citral in the relative proportion in which they were understood to exist.

It was subsequently found that citronellal was associated with citral, and had some influence upon the taste and odour of the oil, and mixtures of these two aldehydes obtained from their most economical sources were suggested as a still more efficient substitute for natural concentrated lemon oil.

It was found, however, that no blend, no matter in what proportion the citral and citronellal existed, possessed the same peculiarly sweet character as the natural oil.

Several methods of estimation of these aldehydic constituents have been put forward, dependent upon the formation of compounds with phenyl hydrazine, hydroxylamine, and also other characteristic crystalline compounds.

Garnett subsequently proposed (*P.J.*, vol. 56, p. 323) the estimation of citral by reduction to geraniol, but the accuracy of this method was at once contested by one of us (*P.J.*, vol. 56, p. 360) as a result of experiments already conducted very much on the same lines as that worker had followed. Messrs. Schimmel &

Co. some months later also detailed in their annual report (Oct., 1896) very many experiments to disprove the correctness of Garnett's assertions. These processes, however, for the determination of the odour-value of lemon oil consist solely in estimation of the aldehydic constituents.

We have noted, however, that a simple concentrated lemon oil, in which every care has been taken to free the product from stearoptene and resinified products has a pleasant odour which is not associated with a concentrated oil separated by chemical means and consisting practically entirely of mixed aldehydic constituents. We have therefore sought to determine to what this difference is due, and, we think, with a result that may be of some importance.

For the purpose of our experiments we concentrated 2000 c.c. of lemon oil to 200 c.c. under reduced pressure, and lest any of the odorous constituents should have been carried over, again concentrated the 1800 c.c. of distillate to 100 c.c. and reserved that also. The aldehyde was removed from these concentrated oils by repeated treatment with solution of acid sulphite of sodium of 30 per cent. strength, when a considerable quantity of uncombined oil was separated which possessed an odour recalling geranyl acetate.

Advantage was now taken of the knowledge that both citral and citronellal when thoroughly acetylised form alkali absorption bodies (citronellal reacting quantitatively, citral only approximately) to get an idea as to the total amount of acetylisable bodies present.

The concentrated oil after acetyllising for two hours was found to contain 68 per cent. alkali absorption bodies, which corresponds to about the same percentage of aldehydes. An attempt was made to check this result by estimating the concentrated oil with acid sulphite of sodium in a Hirschsohn flask, and though the reading was almost impossible owing to the separation of the insoluble citronellal bisulphite compound, yet it could be taken near enough to show that bisulphite did not indicate this amount of aldehyde, and that in all probability the difference was due to the presence of an aromatic ester.

This conclusion was confirmed when the aldehydes were completely destroyed by saponification with alcoholic potash solution, the alcohol dissipated and the residue distilled. This distillate was again treated with excess of alcoholic potash solution until no trace of saponifiable bodies was left. The product was then distilled under reduced pressure, and then subsequently carefully

fractionated under ordinary pressure, that portion being separated that distilled between 230 and 250° C.

This was found to possess the characteristic odour of geraniol, and by repeated fractionation the alcohol was separated having characters in the closest agreement with those of pure geraniol.

Considerable difficulty was experienced in determining the nature of the acid combined with this geraniol in the form of ester in the original oil on account of the decomposition products formed in the oil, the evidences of acetic acid which were obtained probably arising from a decomposition of the ester, and pointing strongly to the fact that the ester of that alcohol is the one present.

In order to get an approximate idea of the quantity present, and also to determine whether there was any difference in the proportion present in the normal pure oils of Palermo and Messina variety, large quantities of the oils were operated upon by a slight modification of the process already detailed. Quantities of alcohol corresponding from 1·2 to 1·4 per cent. of ester were obtained; no constant difference in quantity could be said to exist in the two varieties. It does seem, therefore, that up to the present a constituent which has an important bearing upon the odour and taste of lemon oil has been disregarded, and that it is necessary that a concentrated lemon oil shall contain not only citral and citronellal, but also this ester of geraniol, in normal proportions before it can be said to represent in a concentrated form the true odour and taste of lemon oil.

NOTES ON "CONCENTRATED OIL OF LEMON."

By T. H. W. IDRIS, F.C.S.

At a meeting held in a city so well-known in connection with the aerated water industry as Belfast, and with which industry I have been connected for the greater portion of my life, it has occurred to me that notes on the two principal flavourings used in that industry would be of interest to pharmacists as well as to mineral water manufacturers.

Under the presidency of a gentleman who has done good work in this direction, I venture to offer some casual observations on the general results of investigations that have been carried on by me in the laboratory of my firm at various times, extending over many

years, personally, and in conjunction with Dr. Symons, Mr. R. A. Cripps, Mr. Ernest J. Parry, and Mr. Frank Stephens.

It is not necessary for me to recapitulate the various well-known data respecting oil of lemon, such as the specific gravity, rotation, and boiling points of the oil and its various constituents, which can be found in the text-books on the subject and in the published results of Tilden, Bourchardat, Lafont, Beck, Schimmel, Ladell, Criswell, Hofmann, Doebner, Umney, and others, but it may be desirable to remind ourselves that the well-defined constituents of lemon oil consist of limonene $C_{10}H_{16}$ (a terpene), the aldehydes, citral $C_{13}H_{16}O$, and citronellal $C_{10}H_{18}O$, with a small quantity of non-volatile matter. Small quantities of other bodies have been found by different experimenters, and my experience leads me to the conclusion that even pure lemon oil is a much more variable article than is generally supposed, and commonly contains about 4 per cent. of some body or bodies heavier than terpene and which cannot be classed amongst the other constituents mentioned. With a view of elucidating this I hope to carry out more complete experiments and to report the result later on; but this note is not written with the intention of explaining any complex chemical problem relating to the exact constitution or the composition of lemon oil and of the various bodies contained in it, but more with the idea of showing how some easily separable substances can be obtained from lemon oil, and which contain in a concentrated form most of the odoriferous and flavouring principles of the oil. The term concentrated oil of lemon is, of course, a misnomer, as the terpene (limonene) has a flavour and pungency which are peculiar to itself. It is well known that, in addition to the changes which occur from age or from exposure to air, oil of lemon decomposes much more rapidly when diffused in water or aerated water, and this most objectionable occurrence from a manufacturer's point of view renders lemonade made from oil of lemon unpalatable in a very short period, and this change is generally, and I think rightly, attributable to a change in the terpene, an odour of turpentine being developed. To obviate this difficulty various tinctures of lemon peel are used by many manufacturers, but lemonade prepared in this way, although having much better "keeping" qualities, is somewhat deficient in the aroma of lemon aldehyde which is desirable in a good beverage.

Essence dealers and manufacturers have accordingly been offering various forms of "concentrated soluble essence of lemon." The first specimens which I came across under this designation were

simply oil of lemon with an addition of alcohol; but although the addition of alcohol in a proportion of not less than 10 per cent. absolutely prevents change in oil of lemon, and is consequently a desirable adjunct, the change in the oil when diffused in water is not lessened.

Other samples that I met with contained in addition to the alcohol other flavourings which appeared principally to be additions of small quantities of lemon grass oil or of citral obtained from that oil, and in some cases an admixture of ethers with the oils of lime and orange. All these mixtures are not of much value to the mineral water manufacturer, but the so-called "terpeneless oils" have been an introduction of decided utility. These "terpeneless" oils as sent out by the makers differ considerably, and the principal object of my note is to call attention to a method by which the lemon aldehydes in oil of lemon can be separated without much change and in a state of comparative purity. Fractional distillation of oil of lemon cannot be carried out at the normal pressure of the atmosphere without considerable change in the oil and in the products, but this difficulty is overcome by fractional distillation under reduced pressure. If oil of lemon be treated in this way, and about 85 per cent. distilled at a temperature below 100°C ., the distillate will be found to be perfectly white, with a very poor lemon odour, the specific gravity being that of terpene. The distillate will not give any aldehyde reaction. If the remaining 15 per cent. of residue be treated with bisulphite of sodium in the usual way a crystalline mass will be obtained. I find, however, in practice that it is more desirable to distil about 90 per cent. of the original oil. The remaining 10 per cent. is an oily liquid which, on cooling, deposits a white sediment. The gravity is about 0.902 to 0.905, and when mixed with rectified spirit it deposits a dense flocculent precipitate. If distillation of the 10 per cent. residuum is continued under reduced pressure, a very aromatic, colourless oil is obtained, amounting to about 7 per cent. of the original oil; but I find that a better product results from passing steam through the residuum, when a pale yellow oil is carried over and floats on the water. This possesses to a very marked extent the pure lemon aroma, and is a very different article from citral. The final yield from most oils operated upon in this manner is approximately 6 per cent. to 7 per cent. of the original oil, and it is found to be very useful in improving the flavour and aroma of lemonade. The residue solidifies on cooling, and only faintly smells of lemon. The terpene from treating con-

siderable quantities of oil of lemon was not thought to be of much value; but I found later on that it could be readily disposed of at about one-third of the cost of oil of lemon, and the eagerness displayed in buying at this price suggested to me that it must be used as an adulterant, and it will be readily seen that it is quite possible to prepare an oil from what appears to me to be the useless residues and the addition of citral from lemon grass oil, which would have the correct gravity, boiling point and rotation of oil and rotation of distillate (B.P., 1898 test), and with or without being mixed with the genuine lemon oil well-nigh impossible to detect, showing even the normal amount of aldehyde. I am also of opinion that mixtures of levo-rotatory (French) turpentine or dextro-rotatory (American) turpentine with other oils and citral can be made and are made, so that it is impossible to distinguish them from pure lemon oil by any known chemical or physical test. The question naturally arises, how is it possible to judge of the purity of lemon oil if all the usual tests have proved to be futile? I venture to suggest that the best test of the purity of oil of lemon is treatment in the way that I have indicated, and then to judge of the value of the oil by the flavour and aroma of the separated aldehydes.

Modifications of this process of concentration and subsequent separation under diminished pressure is applicable for preparing terponeless lime, orange, and many other oils.

The PRESIDENT, in moving a vote of thanks to the authors, regretted that Mr. Idris was not present, as his paper was one of great interest.

Mr. E. M. HOLMES said he had listened with considerable interest to both these papers. As the result of experiments he had made with citral and sugar, he had come to the conclusion that citral could not constitute the entire flavouring of the lemon, but that there must be other bodies which formed part of the flavour. One of several specimens that Mr. Umney had submitted to him seemed to certainly represent the exact flavour of lemon peel. He was curious to know what this was due to, and was glad to learn that there was another ingredient present in the lemon which modified its flavour. He was not quite sure that Mr. Umney had got out everything which represented the flavour of lemon. Most of the essential oils did not represent in any one ingredient the actual flavour of the drug itself. He hoped Mr. Umney would still further extend his observations, as he was sure there was a

results may be obtained by the hydroxylamine method (Kremers and Schreiner).

	Sp. gr.	Opt. Rot.	Below 200° C.	200-210° C.	210-220° C.	220-230° C.	Above 230° C.
English distilled from fruits grown at Market Deeping	·9143	+72·25°	22	11	12	50	2
English distilled from fruits grown at Canterbury . . .	·9146	+80·25°	21	19	12	46	2
German	·9002	+70·258	53	13	12	17	5
Indian	·9486	+47·5°	21	17·5	7	10·5	39
Japanese	·9613	+50·5	21	12	10	8	49

The oil distilled from the German fruits has practically the same characters as that distilled from the English fruits, provided that no separation of carvol has taken place, as in sample No. 3, a practice adopted to some extent on the Continent.

I have not been able to obtain a sample of the Spanish fruit for distillation, but have examined an oil reported to be distilled from Spanish fruit which possesses practically the same characters as the German oil.

It is evident, from the characters of the essential oils, that the Indian and Japanese varieties, although agreeing amongst themselves, differ very considerably from the English and German, and it cannot be supposed that the apiol-like body already referred to is devoid of powerful physiological action. It is imperative, therefore, that the English or German dill fruits should be employed for the distillation of dill water, and that the characters of the essential oil prescribed by the new Pharmacopœia should be rigidly adhered to, thus excluding the Indian and the Japanese varieties.

The PRESIDENT asked if the rotatory power of the Indian and Japanese oils had been determined, and compared with that of oil from English grown seed.

Mr. HOLMES said botanists and horticulturists somewhat differed in their ideas as to whether two plants should be called distinct species or only varieties. The different varieties of the apple had very different flavours, and the amount of acidity and astringency in them varied considerably, but botanists classed them all as the same species. The Indian dill and English dill, although very

similar in flavour, had been shown by Mr. Umney to differ in their chemical constituents. As far as he could judge from seeds he had succeeded in growing, the Indian fruit was more convex and narrower than the English, but apparently botanists did not consider these differences sufficient to warrant them as regarding it as a distinct species. It appeared, therefore, that two plants which only differed slightly in botanical characters might contain very different bodies, and might act in a very different way. This showed the importance of limiting the drugs used in the Pharmacopœia to particular forms so as to ensure uniformity both in constitution and strength. He should like to know whether the amount of apiol present in the Indian oil had been ascertained.

Mr. DRUCE said there was an instance in the Umbelliferae, *Cicuta virosa*, which in the south of England was considered a dangerous poison, but when grown in the neighbourhood of Edinburgh had no noxious property. At the same time botanists did not consider the plants different.

Mr. BRODIE said he remembered the late Professor Henry Roger, of Glasgow, making a remark to a similar effect, and mentioning the names of certain plants, though he had forgotten what they were. He said it was a well-known fact that many plants grown in England elaborated poisonous properties, which, when grown in Scotland, were harmless.

Mr. J. RUTHERFORD HILL said there was a paragraph some time ago in one of the medical journals stating that *Contium maculatum* grown in England was poisonous, but that when grown in the neighbourhood of Edinburgh was not so, and he had the curiosity to test the truth of the statement. The result was that fruits carefully collected in the neighbourhood of Edinburgh were found to contain a larger percentage of the alkaloid than similar fruits collected in England. He took it, therefore, that all such statements required careful investigation.

Mr. MARTINDALE said he thought the statements referred to had gained currency on the authority of Professor Christison.

Mr. J. C. UMNEY, in reply, said the oil from Indian seed showed an optical rotation of 47.5° in a tube of 100 millimetres and Japanese 50.5° . The limit allowed by the Pharmacopœia was 70° . He could not say the amount of apiol present in the Indian and Japanese oil, but from 35 to 40 per cent. of the oil distilled over above 230° .

A vote of thanks was accorded to Mr. Umney for his very interesting paper.

The next communication was entitled :—

THE SALIENT FEATURES OF THE IRISH FLORA.

By G. C. DRUCE, M.A., F.L.S.

Last time I had the privilege to address the members of the Conference, I was permitted to draw their attention away from the more strictly scientific and practical side of our calling to a subject which was once considered to have interest to all pharmacists, at any rate for that short period of their existence which was spent in preparing themselves for the qualifying examination of a pharmacist, but which, alas! is now being pushed more and more out of our pharmaceutical curriculum; I mean the systematic and morphological branches of that huge and unwieldy science known as botany. Such names as Bentley, Daniel Hanbury, Stoddart, Brady, Henry Groves, and Deane we know placed a high value on that portion of pharmaceutical training known as field botany. Therefore I welcome the kind offer to spare me a few minutes while I endeavour to sketch the salient features of the Irish flora. Those who had the misfortune to be present when I traced the special characteristics of the Scottish flora last year may perhaps remember that I pointed out that it was the alpine flora which was especially represented in Northern Britain, and its chief similarities and alliances were to be found in the Scandinavian flora, of which the Scottish appears at one time to have formed a part. I then said that I believed I had been fortunate enough to prove the presence of another Scandinavian sedge on the Breadalbane Mountains. That the plant I gathered then is the true *Carex helvola* I have since demonstrated to the Linnean Society. Moreover a new species of grass named *Poa cenisia* var. *flexuosa*, and a new variety of *Ranunculus acris*, known previously only from Greenland, were also gathered by me in Perthshire last year.

Politicians have found Ireland a troublesome nut to crack, and to the phytogeographer Ireland also presents its difficulties. Owing to its insular position, its contiguity to the melancholy ocean, and to the effect of the Gulf Stream, which surrounds the whole coast, the climate of Ireland is, especially in the west, more moist and equable than Britain, or, in fact, any part of Europe in the same latitude. I have not attempted to prepare a table showing the rainfall of Ireland, nor can we trust the statements made by British tourists, since I believe the most accurate of them peril

their hopes of salvation by the statements they make regarding the rainfall of Connemara, but it will be safe for me to say that the rainfall on the western side is higher than that of the western side of Britain in the same latitude (I am excluding from this the Lake district of England), and that the rainfall on the western side of Ireland is very nearly three times as much as that on the eastern shores. The mean temperature of the summer months is about two degrees lower than in Britain; and although this sounds only small, yet this trifling variation has very great and far-reaching effects on the vegetation, rendering, indeed, wheat cultivation, which in England is not indeed a more lucrative occupation than our own much-suffering business, a most precarious crop, so that over a large portion of Western Ireland it is unknown.

Not only, therefore, have we in Ireland a lower summer temperature, a heavier rainfall, but we have a more humid atmosphere and a smaller amount of sunshine than in England. All these are factors in producing a flora whose elements differ considerably from that of the adjacent island.

From the table, which is only approximately accurate, it will be noticed that the species of flowering plants are relatively much fewer in number than in England, that is, in the proportion of 18 to 10, while England is poorer by nearly three times than Spain. As compared with Spain, and to a certain extent with England, Ireland is especially deficient in large, bright-coloured flowers such as are to be found in the Compositæ, Labiatae, and the Leguminosæ, which essentially depend for their fertilisation upon butterflies and other insect visitors; while it will be observed that the rushes, sedges and grasses which have not conspicuous flowers and are chiefly well-fertilised plants are, comparatively speaking, represented to a much greater extent.

European Species, roughly 10,000.

	Spanish.	British.	Irish.
Dialypetalæ	2,159	690	372
Gamopetalæ	1,719	187	261
Apetalæ	212	110	81
Angiospermæ	810	438	214
Gymnospermæ	36	5	3
Filices, etc.	66	71	52
	5,092	1,533	1,019

Types.

	British.	Oxfordshire	Irish.
Atlantic	70	3	41
Germanic.	127	39	18
English British	961	737	785
Scottish	117	3	66
Scandinavian or Highland	120	--	40

I now direct your attention to a table which shows the distribution of certain types. By this it will be seen that, as might be expected, there is a great falling off in the occurrence of what are called Germanic types, which in England attain their maximum of development in the Eastern counties, and belong to a central European type of distribution. Out of the 130 possessed by England, only about 20 are found in Ireland, and several of these are not native. In the Scandinavian or high alpine species, of which Great Britain has 130, only about 40 are recorded for Ireland; these latter occur chiefly in the north and west of the island. I remember the first time I ascended Mangerton, in Co. Kerry, I said, having in mind the Cairngorms and Breadalbanes, "Why, here is a mountain without alpine plants"; and although it does possess some, they are few, not only in number of species, but also of individuals, either on that mountain or on the higher and more cragged Carran Tual. But it must not be imagined, from the negative qualities I have mentioned, that to the botanist Ireland is a desert. Such is by no means the case. I shall leave the north, whose acquaintance I now make for the first time; but as long ago as 1875 I worked the west coast, and walked from Westport to Galway over a country made up to a great extent of dreary moorland and bog, but in which there were oases of great natural beauty in which I gathered many interesting plants, some of which are found nowhere else in the British Isles. I shall now proceed to enumerate the chief of these plants which are peculiar to Ireland, and to glance at the types of distribution to which they belong. We have seen that over 800 species found in Great Britain find the Irish Channel too wide a streak for them to cross. On the contrary, about twenty-three species occur in Ireland which are not found in Great Britain. These consist of a rock rose, *Helianthemum guttatum*, growing in Galway and County Cork, which, although common in the Channel Islands, exists only as a variety or sub-species in Anglesey, this variety being also found

in Ireland at Inishboffin. Curiously enough the common yellow rock-rose, so frequent on the English chalky hills and limestone pastures, is very rare in Ireland. In Sligo, a caryophyllaceous plant, the *Arenaria ciliata*, is found near Ben Bulbin, at an elevation of some 1,500 feet. This rare and local species is common in some parts of the European Alps, and I have gathered it near the juncture of the Austrian and Italian frontiers, on the Stelvio pass, at nearly 8,000 feet. A closely allied species, or probably a variety, is found in Sutherland and the Shetland Isles, and is known as *Arenaria norvegica*. The order Saxifragaceæ is well represented in Ireland, both in species and number of individuals; four species occur which are not native in Britain. One of these, the common London pride of our gardens, the *Saxifraga umbrosa*, is abundant in the Killarney mountains, and is found from Donegal to Waterford. Two nearly allied species, *S. hirsuta* and *S. Geum*, are more local and rare, being confined to Cork and Kerry. Two cut-leaved species are also found in the south-west, namely, *S. Sternbergii* and *S. hirta*. The great order Compositæ only yields a single species which does not occur in Britain, namely, the singular *Inula salicina*, which is found on the north-west shore of Lough Dearg, in Galway, and probably two or three varieties of the hawkweed genus may be endemic. The heath order affords four species, namely, the *Mediterranean heath*, which is local in Galway and Mayo, and *E. Mackaa* occurs in the neighbourhood of Roundstone. The latter is considered to be a hybrid of *E. ciliaris* and *E. Tetralix* by some botanists, but in our more recent books it is given specific rank, and it is certainly not identical with undoubted hybrids of the two plants which I have gathered near Truro. The third species of the Ericaceæ is the St. Dabeoc's heath, now scarcely recognisable under the name *Boretta cantabrica* (the name is not derived from the biretta used in the same district). This St. Dabeoc's heath is one of the most beautiful of our native plants, as it has large bells of a charming purplish-red colour, and leaves whose upper surface is of a dark glossy green, but are silvery white underneath, and when seen growing by some trench where the *Osmunda* luxuriates, it forms a sight which will scarcely be effaced from the recollection of the plant-lover. The fourth species is the strawberry tree, *Arbutus Unedo*, whose wood is to the Killarney shops what the olive wood is to those of the Southern Littoral. The *Arbutus* forms a small but handsome tree, having beautiful effects of foliage, and is especially noticeable in that portion of the drive from Glengariff to Killarney, after one has

passed the summit level, down to the lakes, a drive, which, in my opinion affords the most beautiful combination of lake and mountain scenery, and of exquisite variety of foliage, which is to be found in the British Isles.

In the same district of Cork and Kerry is to be found a Lenticulariaceæ insect-eating plant, the great Irish butterwort—*Pinguicula grandiflora*, whose magnificent blue flowers are a striking sight. This was planted near Penzance, and has now become naturalised there. Two species of the Orchidaceæ are found only in Ireland, one, the *Habenaria intacta*, which was discovered by Miss More, the sister of my late friend, the joint author of *Cybele Habernica*, in the limestone pastures of Galway, Clare and Mayo, near Lough Corrib, and the other still more interesting species, the Irish lady's traces, *Spiranthes Romanzoffiana*, which was first discovered by Mr. Drummond at Berehaven, near Cork, in 1810, and which has recently been found in the north of Ireland, in Armagh and Derry, but is known for no other European locality. The order Iridiaceæ affords *Sisyrinchium angustifolium*, which grows in meadows near Woodford in Galway, and also in Kerry, and has blue flowers; and in 1896 my friend, the Rev. E. S. Marshall found on the eastern coast of Ireland, in Wexford, the yellow-flowered *Sisyrinchium californicum* in large quantity and completely naturalised, but of whose indigenuity I am not yet convinced. Two plants of the Pondweed order also occur in Ireland only in the United Kingdom, one of which is considered to be a hybrid; the other is *Potamogeton sparganifolium*, which is found in Galway. One sedge, *Carex rhyncophylla*, has recently been added to the Irish flora from the central part of Armagh, where Mr. Praeger found a single tuft near Mullaghmore Lough. Two horsetails, one a species *Equisetum Moorci*, so named after the well-known botanist of Glasnevin, occurs in Wicklow, and the other one, a variety of *E. variegatum*, called *Wilsoni*, which has a wider range of distribution. A single hybrid fern, *Asplenium Clermontæ*, has been found, and three species of Characeæ, *C. denudata*, *C. tomentosa*, and *Tolypella nidifica*, complete the list of plants which occur in Ireland only in the United Kingdom. Most of these will be found to belong to the Peninsular group, so called from the fact that these plants have their headquarters in the Spanish Peninsula, and by some authorities are said to suggest a former continuity of land between the two countries. In addition to the special species mentioned there are some other species of the Peninsular group which occur in Ireland, such as

Erica ciliaris, *Trichomanes radicans*, *Adiantum Capillus-veneris*, *Simethis bicolor* (now almost destroyed at Bournemouth), and *Euphorbia hiberna*.

I said that these Irish plants belonged to different types of distribution; by far the greater number belong to the Peninsular group, but *Arenaria*, *Imula*, and *Carex rhynophylla* are somewhat anomalous, and these belong to a group we should not expect to be represented in the British Isles, and that is the American group. To this belong the *Spiranthes* I have already alluded to, and this is found chiefly on the western side of North America and in the Rocky Mountains, but not elsewhere in Europe. The second is the blue-flowered *Sisyrinchium angustifolium*, which is only of adventitious occurrence elsewhere in Europe; the third, being the yellow-flowered *S. californicum* from the western side of North America, is a doubtful native of Ireland. A fourth member of this American group is abundant on the margins of lakes in Connemara and elsewhere on the west coast of Ireland, but, unlike the first three members of the group, *Eriocaulon septangulare*, extends its range to Skye and the Western Hebrides in Scotland, where it is very local. This plant may have been introduced to Ireland from America by the agency of birds.

I have thus briefly glanced at the salient features of the Irish flora, and can promise any botanist who may have leisure that there is an enormous amount of work to be done at the Irish flora before we can say that it is known in the same sense as that of Britain. To those who have time and energy a pleasant task awaits them in exploring some of the wild and beautiful scenery of the Emerald Isle, which always offers a hearty and cheering welcome to any visitor to its shores.

The PRESIDENT said the paper was full of information and would well repay perusal, but hardly called for a discussion, and he would therefore at once propose a vote of thanks to the author.

This was carried unanimously.

The Conference then adjourned for the day.

Wednesday, August 10th.

The PRESIDENT took the chair at 10 a.m., and the business commenced with the reading of the following note, which, in the absence of the author, was read by Mr. Naylor :—

NOTE ON EXTRACT OF GINGER.

By T. H. W. IDRIS, F.C.S.

It is well known that alcoholic extract of ginger, commercially known as "gingerine," does not contain all the aromatic principles of the root, as the essential oil is carried over with the recovered alcohol.

In the course of experiments to produce extract of ginger that would contain the whole of the flavouring and odorous principle, it was found that acetone was the most suitable solvent, boiling as it does at 56° C., and being miscible with water in all proportions. The apparatus used consists of a modification of a Soxhlet on a manufacturing scale. If some powdered ginger be exhausted in a Soxhlet with acetone, and afterwards with alcohol, we find that the whole of the aromatic and pungent principles have been removed by the acetone, showing that it compares favourably with alcohol as a solvent. The acetone extract does not appear to have lost any of its volatile oil in the process of recovery, as is so markedly the case when using alcohol, while the last trace of acetone is easily removed by agitation with a little water. This acetone extract is a dark brown substance of a treacly consistency, intensely pungent, and at the same time possessing a full ginger aroma, the quality of which largely depends on the variety of ginger used.

It is readily soluble in alcohol, forming a deep brown liquid. If steam be passed through the extract and then condensed it carries over a quantity of the volatile oil with it. This oil floats on the surface of the condensed water, forming a yellow layer, and can be easily removed. The difference in aroma of the various kinds of ginger, though noticeable enough when examining the rhizome, is much more apparent when dealing with the oils themselves, and in this way a method of distinguishing the variety of ginger used is obtained. The various tinctures and essences of ginger may be very conveniently and readily prepared from this extract without the usual loss of alcohol, and syrup may be flavoured with it by

proper diffusion at a suitable temperature without the use of any spirit, and a further saving may be thus effected in manufacturing ginger-flavoured beverages.

The PRESIDENT, in moving a vote of thanks to the author, regretted his absence, especially because he might have added some details to this small but important paper.

Mr. J. C. UMNEY asked if Mr. Idris gave any figures to show the relative proportion of resin and oil extracted by acetone and strong alcohol, and whether anything was said about the volatilisation of the oil when the acetone was distilled.

Mr. NAYLOR quoted from the paper to show that the oil is not volatilised.

An abstract of the following paper was then given by the author.

MATERIA MEDICA ANIMALIS.

By J. C. McWALTER, L.R.C.S.I., L.A.H.I., M.P.S.

As official recognition has at length been given to the use of animal substances in medicine by the inclusion of certain preparations of the thyroid gland in our new Pharmacopœia, it may be useful to make a short review of some of the principal remedies of animal origin which have recently been tried for the relief of disease.

At the last meeting of the British Pharmaceutical Conference, it was insisted that glycerin was the most suitable solvent for many of these extracts, and that sterilisation was a most important factor in the production of a satisfactory solution. It is pleasant to find that both of these points have received attention in the directions for preparing the liquor thyroidei of the new B.P.

Nothing within the domain of pharmacology is so difficult as to investigate the therapeutic properties of animal extracts, and in none of the sciences ancillary to medicine has so much ludicrous empiricism been displayed as in the efforts to elucidate these properties.

The difficulty lies, of course, largely in the fact that the problem is largely a biological rather than a chemical one. Dealing with vegetable materia medica, we can generally approximate the active principles, and frequently crystallise them in alkaloids. Any competent pharmacist would confidently offer to exhibit, in the

form of extract, tincture, decoction, or elixir, the active principle of any plant submitted to him, but few chemists would claim to be able to bottle in a palatable form the active principles of a calf's brain or a sheep's spleen. We know such organs to have a very complex chemical constitution, and may presume them to be of much therapeutic value in disease of the corresponding organs in the human subject; but what the active principle is, how to discover, extract, and preserve it, constitutes a problem for the scientific pharmacist which should be the more interesting as it is the more difficult, and which has a certain fascination from the fact the solution of it lies on the borderland between the life and death of animal tissues. Continental chemists, who take their duties very seriously, have advocated the establishment of a laboratory where animal extracts and serums could be examined and reported upon, as both physicians and pharmacists are bewildered by the multiplicity of these substances, and confused by the want of any proper standards or tests. The question of the therapy of animal extracts is, indeed, a very proper one for international investigations, but meanwhile something might be done if this Conference were to collect, combine, amplify, and animate the reports of the various scientific bodies throughout the world which are investigating the question. Much of this class of work has already been done in our *Year-Book of Pharmacy*. But I submit that it would still be desirable if we had some work which would present in a concise and succinct form the present state of our knowledge on any of these animal extracts.

Succus Testibus Paratus.—Brown-Sequard sterilised extract must be mentioned in any account of organo-therapy. Animated by a belief in its efficacy he tried it in insanity, carcinoma, chorea, cholera, tuberculosis, senile debility, and in various diseases where stimulation of the nervous system is indicated, and in many cases with apparent success.

Sperminum.—Spermine is a chemical ferment secreted by most glands, and present in the blood in the normal condition. Professor Poehl discovered that it possesses the curious property of preventing the accumulation in the tissues of certain decomposition products, such as leucomanes and creatine compounds, which cause auto-intoxication and predispose to infectious diseases. Cases in which the spermine normally present is absent or deficient are relieved by the injection of soluble spermine, prepared in a sterilised solution from fresh animal glands.

Cerebrum Exsiccatum Pulv.—The modern isopathic movement,

which was started by the remarkable cures effected by the thyroid substance, seemed to hold out great hopes of success in the treatment of neurasthenic conditions and mental diseases by preparations from the healthy brains of animals. A dried preparation from the fresh brains of calves was employed for mental troubles, and a subcutaneous injection, liquor cerebri sterilisatus, for neurasthenia. In the latter disease considerable benefit seemed to follow the use of the injection, but for mental diseases the results have been on the whole disappointing. The failures I am inclined to attribute to the methods of preparation. The benefit of cerebral preparations will probably be found to be due to some highly organised and unstable phosphorus compound, which is possibly destroyed in the process of desiccation. The most scientific method, I submit, is to administer the organ in a condition as like the living state as possible. As the brain contains over 70 per cent. of water, drying obviously entails too great a change in its molecular constitution. As we are ignorant of what proportions of its active elements are soluble in glycerin, alcohol, oil, or water, solutions or extracts are out of the question. The only available form seems to be an emulsion, something like Mr. Martindale's pancreatic emulsion. The following will, I think, be found practicable: Fresh lard, melted, 15 ozs.; distilled water, 15 ozs.; grey substance of brain of recently-killed calf or sheep, 15 ozs.; powdered gum tragacanth, 300 grains; oil of bitter almonds, 15 minims. The brain, freed from membrane and white substance, and hot from the animal, should be dropped into the melted lard, and the mixture strained through a coarse horse-hair sieve. The tragacanth should next be added, and the water added *secundem artem* to the mixture in a sterilised mortar. The oil of almonds is to be added last, and the emulsion dispensed in wide-necked bottles. Independent of any specific effect which the brain substance may have in cases of cerebral mischief in the human subject, the emulsion must obviously be of use in checking the excessive waste of tissue which so often accompanies it.

Cerebrum Siccatum.—A preparation of the dried grey matter of calf's brains, from which the fat has been removed, has been tried in cases of melancholia and chronic mania. Dr. Robertson has recorded improvement in cases which were treated with daily doses of $\frac{1}{2}$ to 1 drachm.

Glandulæ Suprarenales Siccata Pulv.—There is a little gland, shaped like a cocked hat, and perched on the tops of the kidneys of most animals. Its function has long been a puzzle to physiolo-

gists. It had been noted, however, that in the curious affection characterized by bronzing of the skin, and known as Addison's disease, that these glands were usually atrophied. Naturally, the fresh and healthy glands from animals have been tried in this affection, and with wonderful results. Drs. Oliver, Sanson, and Jones describe a change in the discoloration of the skin, a rapid increase in weight, and an extraordinary improvement in general health as having followed their use. The internal administration seems to cause great constriction of the arteries, with consequent increase of the blood pressure and stimulation of the heart's action. Hence they seem likely to influence favourably all those diseases which depend on loss of the vasomotor tonus, as neurasthenia and several cardiac affections, some forms of albuminuria, diabetet and Grave's disease. Merck (whose notes I have freely availed of) asserts that the active principle is not destroyed by the gastric juice, and hence they may be given by the stomach. He advocates the use of a powder prepared from the fresh capsule of which one part is equal to five in the recent state. This is administered in doses of from three to five grains, after meals, two or three times a day. Other investigators claim that glycerin is a satisfactory solvent and recommend a glycerin extract for internal use. This should be made, of course, from the fresh gland.

Altogether the suprarenal capsule seems one of the most promising and interesting resources of organotherapy.

Hypophysis Cerebri Siccata Pulv.—That portion of the brain which rests on the bony structure known as the "sella turcica," and which is called the pituitary body, has been found to be affected in the disease known as acromegaly, in which the extremities are enormously increased in size, and headache with neuralgic pains are distressing symptoms. Dr. Marinesco administered the pituitary body taken from the skull of an ox in three pronounced cases of this disease. The most pronounced effect was a considerable increase in the diuresis, but the neuralgic pains and headache were considerably lessened. It has also been tried in some twenty cases of epilepsy, but so far from relieving, decidedly aggravated the condition. In some cases a new state of exaltation was produced, which presented features entirely different from those which had been observed before.

Iodine has been discovered in the pituitary body, and this fact has lent strength to the belief that it acts vicariously with the thyroid gland. Schiff's investigations have shown that, under certain conditions, the process of elaboration of tissue in the

human economy may be influenced by the introduction of preparations of the pituitary body. In healthy young persons no effect is produced, but in an elderly man and a patient suffering from acromegaly the use of this substance produced an intense increase of the total secretion of phosphoric acid, which was not due to the increased metabolism of albumin, as clearly demonstrated by the excretion of nitrogen. Hence the use of the hypophysis cerebri obviously leads to the decomposition of tissue rich in phosphorus but poor in nitrogen, or bone tissue. The causal connection, then, between acromegaly and the pituitary body seems to be demonstrated, and any failure which has attended its use in cases of this disease is probably due to an insufficient acquaintance with the pharmacy of the pituitary substance. It has generally been administered in tablets containing about 2 grains of the dried substance, which is equivalent to about six times as much of the fresh organ, but sufficient care does not seem to have been taken to ensure that the pituitary body was removed sufficiently soon after the death of the animal, or to observe such aseptic precautions as would preserve its active principle from post-mortem changes. Merck favours a preparation which he calls opohypophysinum, and which is made by treating the substance with a saline solution.

Medulla Ossium Rubra.—Modern physiological investigation has shown that the red marrow of the bones is the birthplace of red blood cells. The use of this substance then seems most rational in anæmic conditions. Several British practitioners have examined the properties of bone marrow, and their experiments met with positive success. Dr. Barrs even treated successfully a case of pernicious anæmia which had been made worse by treatment with arsenic; chlorosis and rachitis have also been much improved under its use. On the other side, Dr. Hunt reports in the *Lancet* that he found the preparation perfectly indifferent in three cases of pernicious anæmia in which it had been specially ordered. Most of these reports had been made on a dry preparation of bone marrow, but that obtained by macerating the fresh bones in glycerin gives a far more active solution, which is undoubtedly of great therapeutic power. Merck points out that it is absurd to use the organs as such, as they are merely vehicles for their useful secretions, much in the same way as nature's metabolism is influenced, not by the tissues, but by their diffusible products. To administer liver for liver complaints, calf's brain for diseases of the brain, etc., is an attempt to enforce the axiom of Hahnemann,

"*similia similibus curantur.*" Modern investigation has shown that the animal tissues, like many micro-organisms, may optionally exist under aërobic and anaërobic conditions, and that the anaërobic existence of the tissues has, after the death of the animal, considerable influence in the chemical nature of the tissue fluid. Poehl has proved that by the evaporation, even *in vacuo*, of the glandular extracts, a series of therapeutically important substances vanish, which he ascribes to the anaërobic activity of the glands, since during slow drying processes he found it impossible to avoid this post-mortem function of the glandular cell tissue. Modern medicine requires that only the isolated active components of the organs should be used in practice. Our knowledge of these is very defective; but an element called "spermine" seems common to all organs which are employed for therapeutic purposes, and seems to give them their general tonic effect. Other substances are also present possessing specific therapeutic properties, and these are asserted to be leucomaines—that is, the basic bodies regularly and continuously formed by the physiological processes going on during the decomposition of the protein substances. Since the precipitable albuminoids do not participate in the healing process, their diminution is desirable; moreover, their elimination implies that of a whole group of toxic proteids. Now many of the leucomaines form with chloride of sodium double salts, which are freely soluble in water and highly diffusible. Hence Merck and Poehl have devised a plan whereby the active principle of the fresh gland is represented by a substance prepared with salt, whereof one part is equivalent to ten parts of the fresh gland. Considered from the purely pharmaceutical aspect, the process is an intensely interesting one, while it is claimed that in the short period which has elapsed since their introduction a whole series of successful applications have been recorded.

Ovaria Siccata.—Without doubt the ovaries, like other glands of the human organism, contain certain internal secretive products which occupy important relations to the entire system. Further, it has long been observed that the cessation of menstruation, either naturally or in consequence of ovariectomy, is followed by a series of disorders which manifest themselves principally in the shape of nervous troubles. The clinical experiences of a number of physicians go to show that the brilliant results which have followed the use of thyroid preparations in cachexia strumipriva, may be rivalled by the success of ovarian medication in climacteric troubles. By the administration of dried ovarian substance, or of

an ovarian extract, it has been found possible to repress, for a shorter or longer period, or, in some cases, even permanently, all the symptoms of sympathetic neurosis, such as, palpitation of the heart, failure of memory, nightmare, insomnia, ordox fugax, etc. In many of the cases experimented on, other therapeutic measures had already been tried with little effect, hence the beneficial results of the ovarian gland are the more remarkable.

The dried ovarian substance, prepared by removing the fat as far as possible from the entire ovary of the cow, and drying the substance under antiseptic precautions at a temperature not exceeding 40° C., is the preparation introduced by Merck, which has principally been used. A glycerin extract, made by macerating the warm gland in sterilised glycerin, ought to be a far more active and elegant form for administration. The ovaries vary very much in size, but average about 3 drachms each, but when dried five ovaries weigh about 2 drachms, and of this a daily dose of from 8 to 16 grains suffices, either in tabular or pilular form.

Denaezer makes a preparation of the ovarian tissue which he terms an albumose. This is made by macerating 20 parts of the fresh tissue in a mixture of 30 parts of water with 3 of active pepsin and 9 part of hydrochloric acid for six hours at a temperature of 40° C. The solution is afterwards brought to the boiling point and neutralized with sodic carbonate, filtered while still warm through a soft filter, which will absorb the fat, and then dried.

Renes Siccata.—Cases of kidney disease are amongst the most intractable in medical practice, and when we find that one observer noted an improvement in thirty-five nephritic patients, to whom he administered the fresh kidney, or an extract prepared from it, the remedy seems of much value. In these cases the flow of urine was increased, whilst the proportion of albumin diminished or disappeared. In patients suffering from cirrhosis of the kidney, with polyuria, the flow was lessened and the general health improved. Uremic symptoms also disappeared under its use. Dr. Donovan reports similar success in a case of nephritis with general dropsy.

According to Brown-Sequard, the origin of trouble in kidney disease is not that substances remain in the blood which ought to be removed, but rather that an internal secretion, which the kidney normally yields to the blood, is absent in these cases. With this view a glycerin extract of kidneys has been subcutaneously injected in chronic and acute inflammations of the kidneys, and

generally with a gradual decrease of albumin in the urine and an increase of the diuresis and improvement of the patient's condition. The dry preparation, of which one part is equal to six of the fresh kidney of the pig or sheep, does not seem to be so active as the fresh gland or the glycerin extract. That preparation, procured by peptic digestion and termed an albumose, is a thick, heavy, compact powder, unlike the majority of such preparations, which are light and spongy.

Like most other drugs, the renal extract has been essayed in epilepsy. The results were far from gratifying, as the fits became even more frequent, though this was probably due to the cessation of the ordinary bromide treatment. Promising a therapeutic agent as kidney extract seems to be, and large as is the field for its activity, but few reports have appeared in it of late. This is probably due to an attempt to force the use of dried preparations which seem to be of little value.

Thymus Siccatus.—This is a peculiar gland situate in the neck of infants, which seems to exercise considerable influence on the development of the body during foetal life and the first years of infancy. As the child grows it gradually becomes functionless and atrophies. This thymus gland is assumed to secrete a fluid which modifies the composition of the blood to a marked extent, and which is to some extent antagonistic in its effects to the secretion of the thyroid gland. The gland is treated by peptic digestion as described above and the solution evaporated to dryness in a porcelain vessel.

It is claimed that this method is applicable to any organ, and that the resulting powder represents the active principle in a form which keeps indefinitely if preserved in a sterilised flask. Moreover, it is soluble in glycerin or water, making a solution of a very agreeable flavour, and it can readily be made into pills, tablets, or powders. The strength can be so adjusted that 1 part of the albumose shall be equivalent to 10 parts of fresh tissue. When dissolved in glycerin, and repeatedly filtered, the solution gives no trace of insoluble albuminoids, and will keep indefinitely in a sterilised and sealed flask.

Prostata Siccata Pulvis.—The prostate gland is situated at the neck of the bladder, and, being peculiarly liable to become hypertrophied in old people, is a fruitful source of trouble by causing strangury, ischuria, etc. The condition was ordinarily supposed to be but little amenable to medical treatment, and the surgical methods employed are always risky and not invariably

successful. At the International Congress of Medicine, held at Munich, Dr. Reinert reported that he had tried the effect of the chopped prostate gland of a bull on a patient suffering from hypertrophy of that organ. He administered a quarter of a gland, finely chopped in bread and butter, two or three times a week. After a few weeks the organ had grown considerably smaller, the patient improved in general health, the difficulty of micturition was lessened, there was an absence of sugar and albumin. Failing fresh prostates an extract should be made by macerating the still warm organ from the animal in a saline glycerin solution, according to the formula published by the *Archives of Physiology*, that is to say :—

Fresh Gland	2 parts.
Sterilised Glycerin	2 "
Saline Solution (50 per cent.)	1 part.

Moderate for forty-eight hours, and filter frequently until clear.

Tablets are also made containing 2 grains of dried prostatic substance. These are taken in doses of five daily. It does not seem to be the best form for administration, as much of the tissue of the gland is of an interstitial character, and probably inert, whilst the parenchymatous tissue, which is probably the active part, must be more or less changed in the drying process. The disrepute into which this remedy seems to have fallen is probably due to the bad pharmacy displayed in the preparations offered in commerce. Although it is now generally concluded that the therapeutic properties of the thymus gland are opposed to those of the thyroid, it was at first tried as a substitute for the latter in diseases of that gland affecting the human organism. It was found, naturally, to succeed in cases where the thyroid had failed, and to be followed by an increase in the formation and excretion of uric acid. Unlike the thyroid, there were no such secondary effects as decrease of weight, disturbance of the heart's action, etc. The proper use of the thymus gland is in cases where the thyroid is in a state of abnormal activity, as in Grave's disease; whilst the thyroid treatment is obviously proper in cases where there is atrophy and deficient secretion of the gland, as in myxædema and cretinoid conditions.

The raw gland, fresh from calves or sheep, has been prescribed for defective nutrition in children, and in some cases with marked success. In chlorosis it has also proved beneficial, and is not followed by the feverish symptoms which often accompany the use

of the ovarian extract. It has also been tried in anæmia, leucocythæmia, and paralysis infantum.

Many therapeutists attribute the effects of the thyroid extract to the iodine which it is found to contain—Baumaun has traced the presence of iodine in the thymus gland, where it probably exists in a state of combination, like that of iodo-thyrin. Abelous and Billard have shown that the important part which the thymus gland plays in the alimentation of the organism depends upon its property of producing, like the thyroid gland and suprarenal capsule, substances which neutralize and destroy the poisons formed in the body by the natural process of metabolism.

The fresh gland itself is probably the most effective form in which to exhibit it, as it does not seem to be followed by any injurious after-effects. A powder, prepared by desiccation, the gland freed from fat under aseptic conditions, is prepared by Merck and others; one part of this preparation equals six parts of the fresh gland, and it may be given in doses of 12 to 15 grains in the day.

Thyroidinum Siccatum.—As this preparation is the best known of the animal remedies, and has received the imprimatur of the Pharmacopœia, it is unnecessary to refer further to it. As a result of Hotkin's studies the normal thyroid gland is found to contain two physiologically active bodies: thyroproteid, a metabolic product, which is an active poison, and thyroidin, a specific product of the thyroid cells, which acts as a ferment.

Hepar.—If the liver be removed from an animal, death quickly follows. A partial ablation of the gland may, however, be effected without an immediately fatal result, but if the quantity removed be considerable, the animal dies in from eight to twelve hours. When an extract prepared with glycerin from the fresh liver tissue is injected into an animal it survives for several days.

This fact proves that the liver secretes a substance which, when introduced into the veins, neutralises the toxic effects of the bile present in the blood, and prevents the formation of tox-albumins. It also shows that the necessary substance can be procured from liver tissue by a simple pharmaceutical process. It becomes at once obviously important to supply, in presence of the morbid conditions of the liver existing with jaundice, the secretion which is absent or insufficient by the injections of a hepatic liquid which will contain the necessary elements of such secretion.

This hepatic juice appears useful in all cases of intoxication by the bile salts or by the colouring matter of the bile. It should

also be of extreme value in cases of microbial and alkaloidal intoxication. Thus, Kotliob has demonstrated that when fresh hepatic juice is mixed with hyoscyamine, the latter loses its property of dilation of the pupil. This phenomenon does not take place if we use, instead of the fresh juice, the cooked liver. The hepatic juice has also the property of destroying those ptomaines which are the products of putrefaction, and which give rise to enteric disease if not neutralised by the hepatic secretions.

Some French investigators have attempted to isolate the active principles of the liver, and have extracted from it several albuminoids having a coagulating action on the blood. They have also demonstrated the presence of soluble toxins belonging to the group of soluble ferments. Mairet and Vires have arrived at the conclusion that the introduction of an extract of liver into a healthy person causes the temperature to fall, whilst it increases the amount of urine passed. The secretion of urea and the total excretion of phosphoric acid are also increased, whilst the evacuations are rendered more copious and fluid.

Considering the important function which the liver plays in the formation of sugar, the hepatic extract has naturally been tried in cases of diabetes. It succeeded when used hypodermically in materially decreasing the quantity of sugar, although no change had been made in the diet. In cirrhosis of the liver it has been used with marked benefit, and in this disease the hypodermic injection, and the administration *per os* were attended with the like results, particularly as regarded the marked increase of diuresis. The dose given should be rather large; as much as 3 or 4 ounces of the fresh liver in the day. When the liver is dried under aseptic precautions 1 part of the preparation (*hepar siccatum*) is equivalent to 5 parts of the fresh gland, and about 5 drachms daily is the dose. The aqueous extract is very active, but must be made freshly for each application. The glycerin extract is perhaps the most convenient preparation. It can be given in doses of 4 drachms daily.

An interesting use of this remedy is for hæmorrhage. It has been proved that the liver contains a ferment which has the property of coagulating blood. Hepatic extract and powder have been tried in the cases of five phthisical patients, and have rapidly staunched the hæmoptysis without the use of any other application. In other forms of bleeding, as epistaxis and metrorrhagia it has likewise been a success.

The experiments of Claude Bernard proved long ago that post-

mortem changes take place with immense rapidity in the liver, and whilst it is still apparently fresh and sweet. The importance, then, cannot be exaggerated from the therapeutic point of view of endeavouring to fix and extract the characteristic ferments by impressing the gland in sterilised glycerin and salt solution whilst still hot from the animal, and thus preparing a stable glycerine extract.

Lien Preparatus.—The spleen is the principal organ of the body, in which falls the duty of combating infection. It appears to contain a specific substance which is not destroyed by boiling, and which, when subcutaneously injected, produces a considerably increased proportion of hæmoglobine in the blood, and greatly increases the number of red corpuscles. Some observers believe that these effects may be due to the lecithine contained in the spleen. As splenic extract has also the power of increasing the number of white corpuscles, a nucleinic action is also ascribed to it. From the spleen a body containing iron and iodine, and named by its discoverers "linadine," has been extracted, but the therapeutic properties of this extract have not been yet investigated.

An aqueous splenic extract has been employed in the treatment of anæmia and chlorosis, and succeeded in improving the appetite, re-adjusting the menstrual irregularities, and increasing the weight of the body. In malarial cachexia accompanied by hypertrophy of the spleen, splenic extract and bone marrow have been used with most gratifying results.

Lien.—There seems to be need of further elucidation of the pharmacy of the spleen, for Dr. Wood, who employed the extract successfully in Grave's disease, found that when the requisite doses were employed that it gave rise to dyspepsia and vomiting, whilst subcutaneous injection gave rise to local inflammation and supuration. Merck recommends a powder, prepared by drying aseptically the spleens of sheep or pigs (*lien siccatus pulverisatus*), of which one just corresponds to five of the fresh organ. The dose is from 4 to 12 grains thrice daily in water, gelatin capsules, or tablets.

Mammæ.—Dr. Robert Bell has obtained remarkable results by the use of preparations made from the mammary gland of the cow, in cases of uterine fibromata, menorrhagia, and metrorrhagia. He found that the tumour formation was reduced in a remarkably short time, the general conditions of the patient improved, and the pains subsided. The excessive uterine flow was also considerably checked, and in some cases disappeared entirely under the use of

the mammary extract, in conjunction with suitable local treatment. The effects are probably due to a secretion from the mammary gland, which, when absent or insufficient in quantity, results in hypertrophy or disordered function of the uterus, and which, when supplied vicariously by means of preparations from the healthy glands of animals, can restore the uterus to its normal condition. The preparation hitherto used has been the powder from the fresh gland, of which 1 part is equivalent to 8 or 9 parts in the recent state. Of this from 5 to 10 grains are given thrice daily. Another preparation which is likely to be of more efficacy is made by treating the glands with saline solution, and is called *opomamminum*. Of this from 1 to 2 drachms may be given daily.

Pulmones.—Prepared from the parenchymatous lung tissue of robust young sheep. Dr. Brunet having experimented on animals with extracts of lung tissue, and finding it to possess tonic properties in small doses and toxic effects in larger quantities, felt induced to employ the remedy in the human subject. In ten cases of chronic bronchitis, attended by emphysema, torpid and acute tuberculosis, phthisis of the lungs and larynx, the use of the remedy was followed by considerable improvement. Brunet accordingly believes this treatment to be applicable to all chronic diseases of the lungs and pleura, pulmonary abscesses, etc. He gave subcutaneous injections of pulmonary juice in doses of about a drachm; or the juice with a little water on an empty stomach every morning. Dr. Grande treated a phthisical patient with the dried powder in doses of about a drachm daily, and effected an increase of the weight and dispelled the fever.

Glandulae Bronchiales.—The bronchial glands are credited by physiologists with secreting a substance capable of resisting the entry of bacilli into the air passages. Hence it has been thought that the infected and diseased organism might have its natural healing powers increased by the artificial introduction of the glandular substance. This has accordingly been done in cases of tuberculosis, but the results were disappointing, as in each case fever was produced, with rapid emaciation and loss of strength. Discouraging as this result has been, it yet shows that the preparation is by no means impotent, and that, if pharmaceutical skill be brought to bear on the substance, and a preparation elaborated fell from those to albumins which cause the pyrexia, the bronchial gland preparations may yet prove of great value.

Extractum Corporis Ciliaris.—There is a little purplish-black substance in the eye-ball, called the ciliary body, which in its

normal condition filters the serum and secretes into the eye a fluid, the aqueous humour, which is almost entirely free from albumin. In certain diseased conditions, such as sympathetic ophthalmia, the aqueous humour fails to be filtered properly, albumin enters it, and becomes deposited on the crystalline lens, thus gravely interfering with vision. Troubles of this kind can be modified considerably by the introduction of an extract from the ciliary body of the ox's eye, to which a little resorcin is added as a preservative. It can be injected under the conjunctiva or dropped into the eye, 1 drop every two hours.

Glandula Parotis.—A gland is situated in front of the ear, which, when inflamed, gives rise to that condition known as mumps. Frequently when inflammation leaves this parotid gland it settles in the ovaries or testicles. Hence it has been thought that an extract from the parotid might be useful in ovarian disease, and Drs. Bell and McGregor have cured ovarian affections by administering parotid substances. Dr. Bell reports over sixty cases of enlarged and painful ovaries, in which he not only asserted the necessity of an operation, but often effected complete recoveries by the use of the parotid treatment. Parotid gland preparations may be made from the organs of rams or ewes. The dried powder (*glandula parotis siccata pulverisata*) is equivalent to ten parts of the recent gland, and may be given in 5-grain doses, or the warm gland may be treated with sterilised glycerin, to form an extract, or with saline solution.

A few remarks on the general features which should characterize organotherapeutic preparations may terminate this paper.

Organic juices, and all extracts made by the cold process, should present the characteristics of albuminous solutions. They should be coagulable by heat, and be precipitated by strong nitric acid and by solution of potassium ferrocyanide with acetic acid. They give with strong alcohol in excess a precipitate which roughly indicates the strength of the solution, being greatest where the concentration is greatest. They should not give the reactions for albumoses indicated by a precipitation with acetified chloride of sodium, nor should they give the biuret reaction proper to peptones. Most of these preparations can be recognised as to their origin by the smell, or by microscopic examination of the residue evaporated after treatment with alcohol. When in solution they should be perfectly limpid and clear, with no trace of bacterial infection, as evidenced by the absence of any odour of putrefaction, though they may show traces of the characteristic odour of the organ with

which they are obtained. All vessels containing organic extracts should be thoroughly sterilised, and such substances as tablets or powders should be freed from every trace of moisture and preserved in sealed bottles or in a receptacle containing lime.

Thyroid gland tablets should be rejected, unless they show traces of iodine. Dissolve a tablet in water, and add some drops of strong nitric acid, afterwards a few drops of chloroform, which ought to show, after agitation, the characteristic violet tint.

The PRESIDENT said Dr. McWalter had placed before the Conference a great many facts with regard to these animal extracts which were now becoming so numerous, and which, no doubt, were believed to be useful in some cases. Some thought they were returning to those days when a great many animal substances were given internally in a manner which had been regarded as absurd. The paper would be perused with great interest as Dr. McWalter had pointed out the more scientific methods of dealing with these substances.

Mr. STANFORD said they were much indebted to Dr. McWalter for his elaborate paper, and he was quite sure it would be read with very great profit. He would only remark that they knew very little about the chemistry of any of these bodies. He had attempted to show something about the thyroid gland, and there could be no doubt that whatever the active principle might be, the iodine had something to do with it, and with that view Dr. McWalter seemed to agree. With regard to the paper that he (Mr. Stanford) read on the previous day, he now exhibited the thyroiodin extracted from the glands after Dr. Hutcheson's colloid had been precipitated from them, which was a positive proof of what he had said on the previous day.

Dr. McWalter was heartily thanked for his paper.

The following paper was then read :—

NOTES ON FERRUM REDACTUM, P.B., 1898.

By E. SAVILLE PECK, B.A. (CANTAB), PH. C.

The British Pharmacopœia, 1898, describes this as "a fine powder, containing at least 75 per cent. of metallic iron, with a variable amount of iron oxide."

It characterizes it as "a fine greyish-black powder, strongly

attracted by the magnet. It dissolves in hydrochloric acid with evolution of hydrogen and without any smell of hydrogen sulphide, and the solution gives a light blue precipitate with solution of potassium ferrocyanide." It then goes on to describe the method by which the percentage of free metallic iron can be arrived at. It was with a view to ascertaining to what degree commercial samples of ferrum redactum agreed with the tests of the P.B., 1898, that the following investigations were made :—

Fifteen samples were collected from different sources—wholesale houses, pharmacists, hospitals and drug stores. They were mostly received by post—one only being sent out in a bottle (sample X)—and immediately placed in bottles and weighing tubes.

The general appearance was noted in each case, and it will be seen in the subjoined table (A) that with few exceptions the more silvery grey the sample the more free metallic iron it contained. The brown masses mentioned consisted chiefly of ferric oxide (Fe_2O_3).

When treated with hydrochloric acid

(1) No sample was found to dissolve completely, but left a variable residue of carbon and silica (SiO_2).

(2) Hydrogen was liberated, and in all cases yielded a smell resembling a hydro-carbon, such as carburetted hydrogen or an olefine.

(3) When this liberated hydrogen was passed through filter paper soaked in lead acetate solution, in every sample it caused a brownish to black coloration, due to lead sulphide, according to the quantity of sulphur present. The smell of hydrogen sulphide could not be always detected, being probably masked by the presence of the smell of the hydrocarbon. The presence of the sulphur doubtless points to the use of insufficiently purified hydrogen in the manufacture of the ferrum redactum.

(4) The solution in hydrochloric acid gave with a solution of potassium ferrocyanide a blue precipitate varying from a light to dark colour.

Arsenic.—In addition to the above pharmacopœial qualitative tests it was thought desirable to search for arsenic. The means adopted was a modification of a test described in Crookes' *Select Methods in Chemical Analysis* under the names of MM. Many-ençon and Bergeret. One gramme of ferrum redactum was placed in a small flask, and on to it was poured 20 c.c. dilute H_2SO_4 . The neck of the flask was lightly plugged with cotton-wool, tied over with a small filter paper. The latter was then moistened

TABLE A.
Qualitative and Quantitative Analysis of Twelve Samples of Commercial Samples
of *Ferrum Redactum*.

Sample.	General appearance.	Wt. taken for analysis.	Free Fe found.	Per cent. of do.	Sulphides indicated by smell.	Sulphides indicated by lead acetate paper.	Arsenic.	Insol. matter, such as silica and carbon.	Test with litmus paper.
A	Silvery-grey, slight lustre	.2345	.2080	88.67	Nil	Faint trace	Faint trace	Present	Nil
B	Grey with brown masses	.3573	.2599	72.71	Slight smell	Traces	Traces	"	Faintly alkaline
C	Silvery-grey with brown masses	.2165	.166	76.74	Nil	Traces	Faint traces	"	Nil
D	Grey with brown masses	.2515	.2117	84.18	Nil	Traces	Absent	"	Strongly alkaline
E	Black cakes	.326	.201	61.65	Distinct smell	Traces	Traces	"	Nil
F	Chocolate-black	.3385	.141	41.66	Distinct smell	Traces	Slight traces	"	Nil
G	Silvery-grey with brown masses	.606	.4073	67.22	Distinct smell	Slight trace	Faint traces	"	Nil
H	Black	.142	.1013	71.34	Strong smell	Heavy traces	Faint traces	"	Strongly alkaline
I	Black	.255	.170	66.69	Strong smell	Heavy traces	Faint traces	"	Strongly alkaline
J	Silvery-grey with few masses	.342	.2605	76.16	Nil	Faint trace	Absent	"	Nil
K	Dark grey	.8255	.3939	47.72	Nil	Traces	Faint traces	"	Nil
L	Chocolate-grey	.625	.552	88.33	Nil	Faint trace	Absent	"	Alkaline

with 2 or 3 drops of mercuric chloride solution, and the whole warmed gently. The presence of arsenic was indicated by the appearance of a lemon-yellow coloration, gradually deepening to pale yellowish-brown. This is an exceedingly delicate reaction, the presence of 1 part of As_2O_3 in 100,000 parts of water being detected. This test is especially adapted to ferrum redactum, as no zinc is needed to be used, the action of the dilute H_2SO_4 upon the free metallic iron and arsenic generating the arseniuretted hydrogen, and, further, it is unnecessary to prepare a solution of the substance.

Nine samples out of twelve were found to contain traces of arsenic in variable quantities, and suggests the advisability of introducing a limit to its presence in future editions of the P.B.

Its source is probably from the impure zinc used in the generation of the hydrogen used in the manufacture of the sample.

Alkalies, The Detection of the Presence of.—One gramme of ferrum redactum was well shaken and slightly warmed with 5 c.c. of water, filtered and tested with red litmus paper.

When conducting this obviously simple test it is important that no ferrum redactum itself be allowed to come in contact with the litmus paper, because it was found that even those samples which, when treated in the above manner, yielded no alkaline reaction, yet when placed upon the red litmus paper in the dry state and moistened with a drop of water and exposed to the air, after a short while turned it blue; doubtless due to the action of the oxygen and carbonic anhydride in the atmosphere.

Five samples were found to give distinctly alkaline reaction.

The presence of alkalies such as carbonates is of considerable importance, from the fact that the free iron in samples containing them is more likely to become oxidised in a damp atmosphere.

Their probable source is doubtless insufficient washing of the precipitated hydroxide.

Assay.—The British Pharmacopœia, 1898, directs that .25 gm. to be added to a hot solution of 1 gramme of copper sulphate in 15 c.c. of water in a flask that can immediately be well corked, and the whole shaken occasionally during ten minutes. The liquid, after being rapidly filtered with minimum exposure to air and acidulated with sulphuric acid, should not cease to yield a blue precipitate with the solution of potassium ferrieyanide until at least 33.7 c.c. of vol. sol. of potassium bichromate have been added.

This makes the minimum standard practically 75 per cent., more accurately, 74.9488 per cent.

In working the above method it appeared difficult to obtain concordant results until the following modifications and details were complied with.

(a) The ferrum redactum was finely powdered and intimately mixed until completely homogeneous.

(b) The solution of copper sulphate was tested for ferrous iron, found pure, and made according to the strength stated above.

(c) The ferrum redactum used was weighed out by noting the difference in weight of the corked tube containing it before and after pouring some of it out into a flask.

(d) The copper sulphate solution was added cold in the proportion of 15 c.c. to every .25 gm. ferrum redactum taken. The advantage of adding it cold is that the action does not commence until each little particle of free iron has come into contact with the copper sulphate solution. It was found that when a hot solution was added little masses of iron became coated with metallic copper, and resisted the further action of the copper sulphate solution, and thus gave a slightly lower reading.

(e) The flask used was fitted with a Bunsen valve, this being simply a well-fitting cork pierced with a straight glass tube (about 30 cm. in length), a small piece of indiarubber tubing with short slit in it, and glass rod to stop the open end. The oxygen of the air cannot enter, but the steam, etc., has free exit.

(f) The flask was then placed upon a water bath and shaken frequently during half an hour.

(g) It was then rapidly filtered, the precipitated copper and the iron oxides thoroughly washed with boiled distilled water, and the whole made up to 100 c.c. Of this 10 c.c. was taken and to it 10 c.c. dilute sulphuric acid added, standard permanganate of potassium solution (N/10 is a convenient strength) was then run until faint permanent coloration took place. The mean of three or four determinations was taken, the number of c.c.'s used noted and calculated to percentage. The volumetric solution of potassium bichromate was used in the earlier determinations and was found to correspond with the potassium permanganate, but was afterwards discarded in favour of the latter, which was found more convenient in many ways.

By referring to table (B) it will be seen the results were satisfactorily concordant. By referring to table (A) it will be seen that five samples out of the twelve are above the standard of 1898, and six above that of 1885.

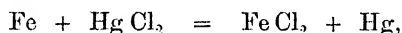
TABLE B.

Estimations by P.B., 1898, Method.

Sample.	Weight of ferrum redactum taken.	Weight of free iron found.	Percentage of free iron.
X1.	·266	·2438	91·68
2.	·294	·2706	92·06
Y1.	·263	·1543	58·68
2.	·246	·1479	60·13
3.	·326	·2010	61·65
Z1.	·335	·1404	41·91
2.	·3385	·1410	41·66

It appears, therefore, that while on the whole the percentage of free iron is fairly satisfactory, the presence of sulphides, carburets, and arsenic points to insufficient care being exercised in some of the minor details of manufacture.

Determination by Mercuric Chloride.—It was thought desirable to compare the foregoing results of the P.B., 1898, method with those of some other, and one was found in Berkurt's *Analytische Chemie*, and this was afterwards found to be practically the same as that employed by the United States Pharmacopœia, 1890. The determination consists in the fact that the free metallic iron is converted by mercuric chloride into ferrous chloride (FeCl_2), according to this equation :—



but there is evidently an intermediate stage, because mercurous chloride (HgCl) is undoubtedly formed and remains present throughout, being filtered off with the metallic mercury and undissolved oxides.

Process.—About ·556 gm. of ferrum redactum was carefully weighed out and placed in a flask with Bunsen valve, and upon this was poured a solution of 2·5 gm. mercuric chloride in 50 c.c. water, or in these same proportions, according to weight taken. The flask was then placed in a water bath and frequently agitated during one hour. It was then allowed to cool and made up to 100 c.c. and well shaken. 10 c.c. of the filtered solution was then taken, and to it added 10 c.c. dilute sulphuric acid, and titrated with the same standard solution of potassium permanganate until a faint permanent red coloration appears, and calculated to percentage of free iron as before, see Table C.

To confirm the assay the slight red colour left over from above was decolorized by the addition of a few drops of alcohol, then about 1 gm. of pure potassium iodide added, and the whole kept at a temperature of about 40° C. for half an hour in well-corked flask. The liberated iodine was then titrated with standard thio-sulphate of soda (N/10 being found convenient), and calculations made. Table C shows that concordant results can be obtained by this method.

TABLE C.

Estimation of Ferrum Redactum by Mercuric Chloride Method.

Sample.	Weight of ferrum redactum taken.	Weight of iron found.	Percentage do.	Percentage from thiosulphate confirmation.
X1 . . .	·5595	·4797	85·74	
2 . . .	·6320	·5413	85·65	
Y1 . . .	·579	·2385	41·19	41·20
2 . . .	·5835	·2433	41·79	41·85
Z1 . . .	·850	·2722	32·03	32·07
2 . . .	·602	·1876	31·16	31·13
3 . . .	·480	·1527	31·82	31·93

By comparing the two methods, as in Table D, it will be readily seen that the copper sulphate method invariably yields a higher percentage of free iron than the mercuric chloride and varies fairly constantly in the same sample.

The reason for this discrepancy appears difficult to tell.

TABLE D.

Comparison of Copper Sulphate (P.B., 1898), with Mercuric Chloride (U.S.A., 1898) Method for Estimation of Ferrum Redactum.

Sample.	Percentage of iron, copper sulphate method.	Percentage of iron, mercuric chloride method.	Percentage. Average difference.
X1.	91·68	85·65	} 6·18
2.	92·06	85·74	
Y1.	60·13	41·19	} 19·40
2.	60·65	41·79	
Z1.	41·91	31·16	} 10·29
2.	41·66	31·82	

It was found that the solution of copper sulphate (as is invariably the case) gave an acid reaction with litmus paper, and it is conceivable that this acid formed with the ferrous oxide (FeO) frequently present in black samples such as **Y**, ferrous sulphate, and so tended to give a higher reading than the correct one. On the other hand, in the mercuric chloride method, the presence of mercurous chloride may have a deterrent effect upon the oxidising action of mercuric chloride upon the free iron present, and so tend to lower the reading in this case; but up to the present I have been unable to find a satisfactory reason for the discrepancy.

Separate Determinations of the different oxides (FeO if present Fe_2O_3 and Fe_3O_4) might throw light upon the subject.

In conclusion, I would venture to suggest that in the preparation of ferrum redactum

(a) The ferric hydroxide should be ordered to be thoroughly washed and the hydrogen carefully purified;

(b) That more stringent tests be added to ensure the absence of sulphides; of more than 1 per cent. of insoluble residue and of alkaline carbonates;

(c) That there should be a limit to the amount of arsenic present, and (d) that various modifications be made in the method for determination.

I have to thank Mr. R. Foster Moore for his valuable assistance in many of the weighings and titrations.

The PRESIDENT said Mr. Peck had dealt very fully with the subject he had taken in hand. No doubt he had taken care that his samples were fairly representative of a number of manufacturers. The Conference was much indebted to Mr. Peck for having brought forward this paper.

Mr. MARTINDALE took great interest in this paper. They were much indebted to Mr. Peck for pointing out the probable presence of arsenic as an impurity. As he had said, it was due to the arseniated hydrogen being developed in the evolution of the hydrogen. He (Mr. Martindale) had been told by the manufacturers that it was impossible to get it free from sulphur. He had troubled manufacturers to get it as free as possible, and the minute quantity to be detected was hardly worth considering. He remembered that Professor Redwood's objection to it was that it caused unpleasant effects when patients took doses of reduced iron containing much sulphide. The 1885 Pharmacopœia directed it to be made from ferric oxide, prepared by precipitating from ferric

chloride rather than from ferric sulphate, the old process. Even then the possibilities of traces of sulphuric acid contained in the different reagents would give that reaction, which could easily be detected. He went over the works in Paris of the Pharmacie Centrale at St. Denis, where they made it themselves, so as to be sure that they got it free from sulphide. He agreed with Mr. Peck in preferring the steel-grey preparation to the darker one. Mr. Peck had objected to the Pharmacopœia process of testing. On reading the process carefully he had come to the conclusion that that process was a little weak in one point which Mr. Peck had hardly noticed, and that was that the precipitated copper which was produced by the interaction of the reduced iron and the sulphate of copper solution was not directed to be washed. He thought there was a slip in that respect. Before he came away his son had tested three samples, and he reported that nothing was said at all as to the washing of the copper precipitate, and that if the solution were allowed to stand for ten minutes with frequent agitation, very concordant results were obtained. Of course, if the process were prolonged, peroxidation was apt to take place.

Mr. SIEBOLD wished to ask whether Mr. Peck had given any attention to the iodine process of assaying reduced iron, and if so, how the results obtained by that process compared with those he had just communicated to the meeting. The iodine method was an old favourite, and though in its original form it was perhaps not entirely free from defects, it left nothing to be desired when applied in the modified form recently suggested by E. Schmidt. According to this modification, an excess of pure anhydrous iodine was introduced from a weighed tube into the flask containing the sample of the finely powdered reduced iron suspended in water. When the reaction was completed, potassium iodide was added to dissolve all the iodine, the solution was then diluted to 100 c.c. and allowed to settle, and the excess of iodine determined in a measured portion of the clear liquid by titration with decinormal solution of sodium thiosulphate. He (Mr. Siebold) had tried this modification and found it to give excellent results, besides being very handy and expeditious. Some further details of the process would be found in the current volume of the *Year Book of Pharmacy*.

Mr. J. UMNEY said he was going to ask the same question as that put by Mr. Siebold, namely, whether Mr. Peck had made any comparison with the iodine process. He (Mr. Umney) was a

student at the Pharmaceutical Society's School when the late Mr. Fuge, who was demonstrator there, worked out this process, which he published at the time with comparisons of the two processes, showing the differences in the results obtained. With regard to the difference in colour, he presumed Mr. Peck referred to the difference of colour in the powders having the same degree of fineness, because that made a very material difference. Another point was that these reduced irons, made at any rate by a German manufacturer who made nine-tenths of them, were sold according to the percentages of iron that they contained, varying from 50 to 55 and 60 per cent., and so on at varying prices.

Mr. HOWARD asked Mr. Peck whether he had made any comparison of the relative delicacy of the different tests for arsenic. If he had compared it with any form of Marsh's test it would be interesting to know which was the most delicate. He was not surprised to hear that Mr. Peck had found arsenic present in most cases, because it was very hard to get any quantity of metallic iron free from arsenic. Unless the iron used was carefully selected and very regularly tested some batches would evidently contain arsenic.

Mr. SAVILLE PECK, in reply to Mr. Martindale, said two of the same samples of ferrum redactum were taken—the same quantity of each—and acted upon with sulphate solution, the more sulphate solution used the greater the percentage of iron worked out at. In reply to Mr. Siebold, he had worked with iodine solution, and found it work very well; but he had not made any comparison between the method and the present B.P., and the American method. With regard to what Mr. Umney had said, he might mention that Mr. Fuge did publish his results on the present B.P. method, but he did not compare those results with the iodine. With regard to the colour, he simply took that as he received it from the wholesale house. He had collected his samples from four sources, viz., wholesale houses, pharmacists, hospitals, and drug stores. He particularly wrote to the wholesale houses for a certain quantity of B.P., 1898. In reply to Mr. Howard, he had not compared the delicacy of this test with the others, but he had made the following experiment. He took 1 c.c. of a 1 per cent. solution of As_2O_3 of hydrochloric acid and detected the arsenic. Therefore it was sufficient to detect unmistakably 1 part in 100,000.

A vote of thanks was unanimously accorded to Mr. Peck.

The next paper was a contribution from the Wellcome Research Laboratory on—

THE CHARACTERS AND METHODS OF ASSAY OF THE OFFICIAL HYPOPHOSPHITES.

BY H. A. D. JOWETT, D.Sc.

It is generally recognised that the methods at present known and employed for determining the amount of hypophosphite contained in the commercial salts are unsatisfactory. The object of this investigation was, therefore, to devise an accurate method for such determinations, and having accomplished this, it was thought of interest to supplement its description with an account of some of the properties of the various hypophosphites prepared for the purpose of this inquiry.

Hypophosphorous acid was discovered in 1816 by Dulong, and several of its salts were prepared and their properties examined by Rose. Those of interest to the pharmacist and dealt with in this paper are the potassium, sodium, calcium, barium, iron, and manganese salts. The calcium and barium salts are obtained directly, being obtained by evaporation from the resulting aqueous solution. The sodium and potassium salts are prepared by double decomposition from the calcium salt, and may be purified by crystallisation from alcohol, in which both are soluble. The iron and manganese salts can also be prepared by double decomposition or by general methods, but they are insoluble in alcohol. All the hypophosphites are more or less soluble in water, and are easily oxidised to phosphites and ultimately to phosphates. Impurities may be detected by the ordinary reagents, phosphite being detected by the reaction with barium chloride or lead acetate, since barium phosphite is but slightly soluble in water, and lead phosphite insoluble.

P. de St. Gilles first proposed to assay hypophosphorous acid or its salts by titration with potassium permanganate, stating that the oxidation was easily accomplished; whilst Rose proposed the oxidation of the acid by mercuric chloride, and determination of the amount of hypophosphorous acid present by weighing the calomel formed.

In 1887 Lunan (*P.J.*, 1887, p. 773) in examining the acids rejected the permanganate method and adopted the calomel assay method, but did not give any reason for this, nor are any data given to show the accuracy of the latter method.

In 1889 Moerk (*A.J.P.*, 1889, pp. 326, 386, 459) published a

quite a considerable precipitate with lead acetate will yield, when tested as directed, a nearly colourless solution.

In reviewing these proposed methods of assay, it will be noticed that no author adduces the necessary proof of the accuracy of the method, viz., analyses of pure material and of mixtures containing a known amount of impurity. Further, in every method except that of Tyrer no notice is taken of the well-known fact that the chief impurity present, viz., phosphite, will behave in a similar manner to oxidising agents as the hypophosphite. Any method, therefore, to be accurate must either be uninfluenced by any impurities present, or the disturbing impurities must first be removed. Since only Tyrer's method fulfils this first essential condition, it is the only one which calls for comment. His method depends for its accuracy on the completeness of the removal of the impurities by barium chloride, since if any phosphite remained in solution it would reduce the copper sulphate in the same manner as the hypophosphite. Barium phosphite, however, is slightly soluble in water, and this can be easily demonstrated by dissolving the barium hypophosphite of commerce and adding a drop of lead acetate solution, when a precipitate of lead phosphite will be thrown down. This being the case, the method cannot be accepted as accurate, owing to the incomplete removal of impurities. It is thus clear that no method of assay previously described can be considered satisfactory.

In the method I propose, the impurities are first removed by lead acetate, lead phosphite and other impurities being insoluble in water. The excess of lead is then removed by hydrogen sulphide, and the filtrate containing the hypophosphite completely oxidised to phosphate, which is determined either gravimetrically or volumetrically by the usual methods of analysis. I have proved the accuracy of this method by the analysis of pure material and of mixtures of pure material with known amounts of likely impurities. In the course of the investigation I have prepared some pure salts and examined their properties, have made some experiments with the hypophosphites of iron, and have finally made a complete examination of the principal salts of the leading British and American manufacturers, which has afforded some interesting results.

EXPERIMENTAL.

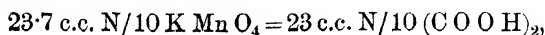
Sodium Hypophosphite.—The commercial salt was purified by boiling a portion with strong alcohol, filtering, and allowing the

filtrate to cool, when long, transparent, prismatic crystals, sometimes an inch in length, separated. The purity of the salt was proved by taking a concentrated aqueous solution and adding a drop of acetic acid and then a few drops of lead acetate solution. If the liquid remained quite clear it was regarded as pure, freedom from other ordinary impurities having been previously ascertained. These crystals were found to contain one molecule of water of crystallisation and to be extremely deliquescent, apparently much more so than the granular salt of commerce. Experiments were made to see if the salt could be dried without decomposition. The pure salt was heated for two hours at 100° , and afterwards for one hour at 110° , when it had ceased to lose weight, and on testing with lead acetate was found to be quite pure. Experiments were made also to see if a solution of the salt in air free water could be boiled without decomposition. This was found to be the case if the water is boiled for at least ten minutes and the salt quickly added; it then suffers no decomposition on further boiling. In the following experiments the salt was dried for one hour at 110° , experiments showing that this procedure dried the salt completely, and without decomposition. The first experiments were made with the permanganate method as follows:—About 0.1 gramme of the dried salt was dissolved in a convenient quantity of water, 1 c.c. sulphuric acid and 50 c.c. N/10 potassium permanganate added, and the mixture boiled for fifteen minutes, the N/10 oxalic acid added till colourless, and finally N/10 permanganate till the faintest pink coloration is evident. If, on standing five minutes, the coloration is unchanged, the calculation is made from the data in the usual way. If, however, the pink coloration fades or changes to a brownish tint, the hypophosphite has not been completely oxidised, and more permanganate must be added, and the operation repeated.

The following results were obtained:—

					Per Cent.
(1)	0.072	gramme pure salt required	33.1 c.c. N/10 K Mn O ₄	=	101.1
(2)	0.0874	" " " "	40.2 " "	=	101.1
(3)	0.1296	" " " "	58.7 " "	=	99.6

The last experiment required an hour's boiling for complete oxidation. The method not giving accurate results, experiments were made to determine the cause of error. A blank experiment showed that, under these conditions,



proving that a portion of the permanganate is decomposed on boiling. This fact and the difficulty of completely oxidising the hypophosphite caused me to abandon this method. In addition to these two errors, there is a third, due to the presence of chlorides, which are frequently found in the commercial salt, and which reduce permanganate. As these errors give respectively too high or low results, it is possible that under certain conditions they might balance each other and give an apparently correct result.

The calomel method was next tried, though there is an initial difficulty by this method in properly drying the calomel. The solution of the pure salt was poured into a solution of excess of mercuric chloride, acidulated with hydrochloric acid and the mixture heated on a water bath for one hour, and the calomel separated and weighed.

	Per Cent.
(1) 0.0488 gramme salt gave 0.4746 gramme calomel	= 101.4
(2) 0.0984 " " " 1.0092 " "	= 101.2

These results and the difficulties of the method led to its abandonment.

The next method tried was that of oxidation and subsequent estimation as phosphate. The oxidation is carried out by bromine, or better, by potassium chlorate and hydrochloric acid in the usual way, and the resulting phosphate estimated gravimetrically or volumetrically by the usual analytical methods. The results thus obtained were very accurate.

	Per Cent.
(1) 0.3096 gramme pure salt gave 0.3924 $Mg_2P_2O_7$	= 100.25
(2) 0.3076 " " " " 0.388 "	= 99.76
(3) 0.298 " " " req. 48 c.c. standard uranium acetate solution (1 c.c. = .005 P_2O_5)	= 99.88

This method having been proved accurate on pure material, it was consequently adopted.

The next experiments were made on a mixture of pure sodium hypophosphite with sodium phosphite.

This sodium phosphite on analysis was found to contain—

Sodium Phosphite	.	.	61.33 parts.
Sodium Phosphate	.	.	11.00 "
Sodium Carbonate	.	.	27.67 " (by difference).

The mixtures thus made would approximate closely to the commercial article, and any other impurities present would either be removed by the lead acetate or would not interfere with the phosphate determination.

After many experiments the best way of carrying out the analysis was found to be as follows:—

About 0.3 gramme of the dried salt is dissolved in 10 c.c. of water, 3 c.c. of a 10 per cent. solution of lead acetate added, and the mixture allowed to stand twelve hours. It is then filtered, the precipitate thoroughly washed, and the washings added to the filtrate, which is acidified with hydrochloric acid, and then saturated with hydrogen sulphide, boiled, filtered, and the lead sulphide thoroughly washed.

The mixed washings and filtrate are then evaporated to a low bulk and 5 c.c. hydrochloric acid and 1 gramme potassium chlorate added and gently heated for half an hour, then concentrated to about 20 c.c., and the phosphate finally determined either gravimetrically or volumetrically by the usual method. The results were as follows:—

Composition of the Mixture.		Found.
Per cent. of $\text{Na P H}_2 \text{O}_2$ present .	90.96	90.38
	98.56	98.30

The method having been thus proved accurate within the usual limits of experimental error, the method of qualitative examination was investigated.

The usual tests were made for metallic impurities, calcium, carbonate, sulphate, and phosphate. With regard to the latter, it must be remarked that the absence of a precipitate with magnesia mixture does not necessarily imply that no phosphate is present, as the test is not so delicate, but that it is certainly not present in more than traces. Attention is also directed to the test for chlorides. Contrary to general statements, it is not easy to completely oxidise this salt by means of nitric acid, and it is therefore necessary in carrying out this test to boil for at least five minutes with nitric acid, then add the silver nitrate and boil for another five minutes if any precipitate is formed. Phosphites and sulphites were tested for in the precipitate produced by lead acetate by the method described by Tyrer. Carbonate and moisture were estimated in the usual way. A series of parallel experiments were made on a sample of commercial sodium hypophosphite, using different methods of assay.

Method.	U.S.P.	Calomel.	Magnesia.	Uranium.
Pure Salt	101.1	101.3	99.76	99.68
Coml. Salt	92.85	92.69	91.40	91.65
} per cent.				

Whilst the results obtained by the uranium and magnesia methods agree, those obtained by the other methods show a higher percentage, due to errors of the method, and also to the presence of phosphite, which would give a high result.

Potassium Hypophosphite.—This salt is anhydrous and can be purified in a similar manner to the sodium salt, but this purification is a little more difficult, due to the limited solubility of the salt in alcohol. The quantitative and qualitative examination of this salt is carried out in a similar manner to the sodium salt, except that in the case of this hygroscopic salt the moisture is not determined.

The assay of a commercial sample by different methods gave a similar result to the sodium salt.

(1) U.S.P. method	95.5 per cent.
(2) Calomel „	97.3 „
(3) Magnesia „	94.82 „
(4) Uranium „	94.42 „

Calcium Hypophosphite.—This salt is not easily obtained pure, and some commercial specimens do not form a clear solution with water. When the salt is crystallised from water by evaporation *in vacuo* at the ordinary temperature three separate fractions gave the reaction with lead acetate, consequently it is not possible to purify the salt by recrystallisation. It may, however, be prepared quite pure in the following manner: To the aqueous solution is added lead acetate in slight excess, the mixture then filtered after standing twenty-four hours, and the filtrate saturated with hydrogen sulphide and filtered. The hydrogen sulphide is then removed by a current of air and the salt precipitated by the addition of alcohol to the aqueous solution. The pure salt crystallises in pearly flakes, which give no reaction with lead acetate.

Several contradictory statements have been made regarding the solubility of this salt in water. The U.S.P. gave 1 in 6.8, Tyrer 1 in 7.2, B.P. 1 in 8, and various text-books 1 in 6, but it is not clear whether these statements refer to the commercial article or the pure salt. Having in my possession a quantity of the pure salt, I determined its solubility and found it to be 1 in 6.43 parts of water at 20°. Of the commercial specimens examined, one only was soluble in 8 parts of water, and some did not form a clear solution even in 14 parts of water. Experiments of heating at 110° and boiling in pure water similar to those made with the sodium salt having shown that the calcium salt is quite stable

under these conditions, the effect of evaporation of an aqueous solution of the pure salt under ordinary conditions was noted. A 10 per cent. solution of pure calcium hypophosphite was evaporated on a water bath to dryness, and the residue on analysis gave 97.73 per cent. of calcium hypophosphite. This may be a cause of the phosphite present in many commercial specimens. The specimens of the pure salt obtained commercially had an appearance which suggests precipitation from aqueous solution by alcohol. Another method of preventing this decomposition would be by evaporation *in vacuo*.

The method of analysis has to be slightly modified for the calcium salt on account of the insoluble calcium phosphate formed. If weighed as $\text{Mg}_2\text{P}_2\text{O}_7$, the best method is to proceed as with the sodium salt, then remove the lead and calcium as sulphate by precipitating with dilute sulphuric acid and adding alcohol. The further operations are the same as with the sodium salt. A better method is to determine volumetrically by uranium acetate, following the usual precaution observed in the presence of calcium and carefully standardising the solution against pure calcium hypophosphite. Good results were obtained by both of these methods on the pure salt.

(1) Found by $\text{Mg}_2\text{P}_2\text{O}_7$ method . . .	100.85 per cent. }
(2) " " Uranium method . . .	99.77 " }
(3) " " U.S.P. (K Mn O ₄) method . . .	97.7 " }

With this salt the permanganate method gives results lower than the actual value.

Commercial Calcium Hypophosphite—

(1) Found by K Mn O ₄ , U.S.P. method . . .	95.97 per cent.
(2) " " $\text{Mg}_2\text{P}_2\text{O}_7$ method . . .	97.49 "
(3) " " Uranium method . . .	97.56 "
(4) " " Calomel method . . .	97.3 "

Barium Hypophosphite.—This salt can be assayed in the same way as the calcium salt, omitting the alcohol in the removal of the barium. The permanganate method here gives results higher than the actual value, as in the case of the sodium and potassium salts.

In a commercial specimen I found:—

(1) By K Mn O ₄ method . . .	98.6 per cent.
(2) " $\text{Mg}_2\text{P}_2\text{O}_7$ method . . .	97.25 "
(3) " Uranium method . . .	97.29 "

As the last two salts are used for the manufacture of hypophosphorous acid it follows that the acid will contain the same im-

purities as are present in them, such as phosphorous acid, etc. The acid can be determined by neutralising with sodium hydrate and proceeding as with sodium hypophosphite.

Manganese Hypophosphite, $\text{Mn}(\text{P H}_2 \text{O}_2)_2 \cdot \text{H}_2 \text{O}$. — This salt is easily prepared by dissolving manganese carbonate in the equivalent quantity of hypophosphorous acid and crystallising from the hot aqueous solution: The purity of the salt will depend on the acid used. It crystallises with one molecule of water, and is somewhat difficult to determine. It cannot be done by the magnesia method, as the manganese cannot be completely removed, but good results were obtained with the uranium method by proceeding as with the calcium salt, but first removing the lead and most of the manganese by ammonium carbonate and ammonia.

In a sample prepared by myself from the commercial acid, I found 98.61 c.c. of manganese hypophosphite.

Iron Hypophosphite.—This salt is official only in the U.S.P., and can be prepared by two distinct methods: (1) From ferrous sulphate and calcium hypophosphite by double decomposition, filtration, and evaporation of the filtrate, when a mixture of ferrous and ferric hypophosphites and phosphites with calcium sulphate is obtained; (2) from a soluble ferric salt and a hypophosphite by double decomposition, filtration, washing, and drying of the precipitate obtained. This product is chiefly ferric hypophosphite with a varying amount of impurity dependent on the purity of the materials used and the thoroughness of the washing. The qualitative and quantitative examination of these salts was carried out as follows:—The tests for calcium, sulphate, carbonate, and chloride, were made in the usual way, observing the precautions necessary, and detailed under sodium hypophosphite. Phosphite was detected by shaking up 0.5 gramme of salt with 10 c.c. of a 5 per cent. solution of sodium hydrate in the cold, filtering, acidifying the filtrate with acetic acid, and adding lead acetate. If much sulphate is present, it is necessary to further test the lead precipitate by reduction. Unfortunately I was unable to devise a method of determining the amount of hypophosphite present in this salt without introducing the error due to phosphite, but this can be partly remedied by noting the amount of lead precipitate in the test above detailed. The determination is then carried out on about 0.3 gramme of salt by first oxidising with potassium chloride and hydrochloric acid in the usual way, then adding 0.5 gramme of sodium citrate and finally excess of pure sodium hydrate. The precipitate is washed thoroughly, the iron con-

tained in it determined iodometrically, and the phosphate contained in the filtrate by the usual analytical methods. A blank experiment performed in this way on a mixture of pure ferrous sulphate and sodium hypophosphite gave—

	Calculated.	Found.
Iron	20·14 per cent.	20·35 per cent.
Ferric Hypophosphite . 100·00	"	99·92 "

These results prove the accuracy of the method, and it may be noted that the presence of phosphite would affect both the iron and phosphate determinations.

Being thus in the possession of a reliable method of assay, I made some specimens of ferrous and ferric hypophosphites by different methods and examined the resulting product.

I first prepared a salt by mixing solutions of equivalent proportions of ferrous sulphate and calcium hypophosphite, filtering and then evaporating to dryness on a water bath. In this way a greenish-grey powder was obtained which contained ferrous and ferric hypophosphite with some phosphite and calcium sulphate.

On analysis the salt gave:—

Ferric Hypophosphite	71·02 per cent.
By U.S.P.	74·95 "
Iron	22·06 "
Calcium Sulphate	13·8 "

This was obviously a very unsatisfactory product, so the calcium hypophosphite salt was replaced by the barium salt, and a reddish powder was obtained which on analysis gave:—

Ferric Hypophosphite	91·52 per cent.
By U.S.P.	89·5 "
Iron	23·88 "
Barium or Sulphate	nil.

If these results are calculated as ferrous hypophosphite the amount present is 102·26 per cent., so that the product consists of ferrous with a little ferric hypophosphite, and some phosphite. This preparation would appear to be satisfactory but for its indefinite composition; recourse was had, therefore, to the ferric salt. This salt was prepared by double decomposition of ferric sulphate (iron alum) or ferric chloride and sodium hypophosphite. The precipitate was washed, but it is very difficult to wash thoroughly without a very serious loss of the hypophosphite, and the salt therefore generally contains a certain amount of this impurity dependent on the salts used. If calcium chloride is

present, the salt will be deliquescent, as stated by Tyrer, but some prepared by myself from iron alum was quite stable in the air. The results of the examination of several commercial specimens showed that both the sulphate and chloride are used in the manufacture of this salt.

A sample prepared from ferric sulphate gave on analysis :—

Ferric Hypophosphite . . .	94.25 per cent.
U.S.P. method . . .	88.25 „
Iron . . .	22.27 „
Sodium Sulphate . . .	4.17 „

This sample contained no ferrous iron, and was a white amorphous powder. The above experiments show that the permanganate method of the U.S.P. does not give accurate results, whilst its use is inadmissible with the ferrous salt. It is clear from these experiments that the best salt is the ferric hypophosphite, which should be used, and not the mixture prepared from a ferrous salt.

Examination of Commercial Specimens.—Having worked out a satisfactory and accurate method of assay for these salts, specimens of the sodium, potassium, calcium, and iron salts were obtained from two leading English manufacturers and also from three leading American houses, and examined according to the method previously detailed.

The English manufactured products are designated B1, B2, and those of American manufacture A1, A2, A3. Of these A1 was sold as purified, the others had the name of the salt only on the label.

Sodium Hypophosphite.

Sample.	Na ₂ CO ₃ .	Moisture.	NaPH ₂ O ₂ per cent. of dried salt.	Impurities.
B1 . .	0.16	3.19	91.52	{ Phosphite, traces Ca, "SO ₄ , "Cl, "CO ₃
B2 . .	0.08	9.92	96.97	{ Phosphite, traces Ca, "SO ₃ , "SO ₄ , "Cl, "CO ₃
A1 . .	0.09	14.41	99.78	{ Traces phosphite, "CO ₃ , "Cl, "SO ₄ .
A2 . .	0.79	1.32	96.53	{ Phosphite, traces Ca, "SO ₄ , "Cl, "CO ₃
A3 . .	0.36	4.09	98.26	{ ditto.

Of these specimens A1 is pure and represents the hydrated salt; the others contain varying amounts of moisture and impurities, the chief being sodium phosphite. The traces of calcium, sulphate, chloride and carbonate present are no doubt derived from the sodium carbonate and calcium salt used in the manufacture.

Potassium Hypophosphite.

Sample.	K_2CO_3 .	KPH_2O_2 . Per cent. of dried salt.	Impurities.
B1 . .	2.8	94.62	Phosphite, traces Ca, " SO_4 ", Cl
B2 . .	0.4	98.06	Phosphite, traces Ca, Cl, " SO_4 ", " SO_3 "
A1 . .	0	98.11	Phosphite, traces " SO_4 ", Cl
A2 . .	3.72	92.52	Phosphite, traces " SO_4 "
A3 . .	0.68	98.51	Phosphite, traces Ca, Cl

Here the impurities present are similar to those found in the sodium salt, but there is an excessive amount of K_2CO_3 in two samples. No sample is as pure as the A1 sodium salt, which must be due to the mode of manufacture. I have before noted that this salt is not so easily purified as the sodium salt. Sulphites, about which some contradictory statements have been made, were present in one sample only, viz., B2.

Calcium Hypophosphite.

Sample.	Per cent. of Ca $(PH_2O_2)_2$.	Impurities.
B1 . .	97.50	Phosphite and sulphate.
B2 . .	98.18	Traces iron, phosphite, and sulphate.
A1 . .	99.37	Traces phosphite.
A2 . .	97.64	Phosphite and sulphate.
A3 . .	99.61	Nil.

Of these A3 was perfectly pure and readily soluble in 8 parts of water; the others were not soluble in this amount, and B1 and A2 did not give a clear solution even with 20 parts of water. B2 contained an appreciable trace of iron, the only metallic impurity met with in the whole series.

Iron Hypophosphite.

Sample.	Iron. per cent.	Ferric Hypophosp. per cent.	Impurities.
B1 . .	22.34	84.12 (Ferrous)	12 p.c. $CaSO_4$, phosphite and Cl.
B2 . .	21.96	89.84	Phosphite, traces Ca, Cl.
A1 . .	22.54	98.84	Phosphite, traces Ca and SO_4 .
A2 . .	28.00	95.02	Phosphite, traces Ca and SO_4 .
A3 . .	20.20	87.58	9 p.c. Na_2SO_4 , phosphite and Cl.

sulphite; also what strength of nitric acid he used in the oxidation. If he used strong nitric acid with soda hypophosphites the action was rather violent with the evolution of nitrous fumes. Dr. Jowett made no mention of lead sulphite—was that perfectly insoluble? because if capable of precipitation by lead acetate it would seem a question whether it was wise to employ it. The paper marked a great knowledge of hypophosphites, and it was certainly an excellent thing to have a reliable process for the preparation of the pure salt. As far as his experience went no such salt could be obtained, at any rate easily in commerce.

Mr. LUNAN asked if Dr. Jowett had made any experiments with a view of preparing hydrogen hypophosphite. Mr. Tyrer had shown that basic sulphate of barium was soluble in basic hypophosphorous acid, but they still wanted a good formula for preparing hydrogen hypophosphites.

Dr. JOWETT, in reply, said he had not thought about the hypophosphates, of which very little was known. With regard to the ferrous sulphate he did use barium salt, and there was a specimen on the table. Lead sulphate would not interfere with the reaction when you again precipitated with magnesium mixture. He had not gone into the preparation of hypophosphorous acid, as the paper dealt rather with the method of estimation. You could estimate the acid quite easily by preparing the sodium salt, and then using the method he had described.

A hearty vote of thanks was then accorded to Dr. Jowett for his very exhaustive and practical communication.

The following paper was then read by Mr. David Lloyd Howard:—

THE BASICITY OF QUININE.

BY DAVID HOWARD, F.I.C., F.C.S., AND D. LLOYD HOWARD, F.C.S.

The question suggested for consideration by the Conference as to the basicity of quinine is somewhat difficult to answer, as theoretical consideration would lead to a different conclusion from that indicated by the use of indicators in volumetric testing.

Everything points to the conclusion that the alkaloid is a "diammonia," to use an expressive, if somewhat antiquated nomenclature; that each of the nitrogen atoms of the molecule

represents a basic nucleus, one of which is much more powerful than the other.

This is shown by the action of ethyl or methyl iodide or bromide, which very readily give a monethyl or monomethyl base, and with more difficulty a diethyl or dimethyl base.

The formation of quinine salts points to the same conclusion. Sulphuric acid will form three definite crystalline salts; one molecule combining with two molecules of quinine to form the ordinary sulphate of quinine of commerce, with one molecule to form the "soluble sulphate" of commerce; or two molecules of acid will combine with one molecule of quinine to form the little known "tetrasulphate." Similarly the monobasic acids, hydrochloric, hydrobromic, and hydriodic form definite crystalline salts with both one and with two molecules of acid to one of the alkaloid.

Whether the "soluble sulphate" should be regarded as forming a hydric sulphate of the stronger basic nucleus or a neutral sulphate of the "diammonium" must be a matter of opinion; but the tetrasulphate and the acid halogen salts can hardly be regarded otherwise than as the hydric sulphate or the haloid salt of the fully saturated base.

The French chemists have always consistently regarded the "soluble sulphate" as the "neutral sulphate" and the sulphate of commerce as the "disulphate," and similarly they speak of the soluble hydrochlorate as the "neutral" salt and the ordinary hydrochlorate as "basic."

This nomenclature frequently leads to confusion, especially to those who do not recognise the old rule of nomenclature now rarely observed, that gives opposite meanings to the Latin and Greek prefixes. We are careful enough to remember that a kilogramme is one thousand grammes, and that a millegramme is one thousandth of a gramme, but we continually find that a disulphate is supposed to be identical with a bisulphate instead of being a basic sulphate, and the exact opposite of a bisulphate. No doubt the risk of this mistake has led to the disuse of the old name "trisnitrate of bismuth" for the ordinary subnitrate of the metal.

If, however, we study the salts of quinine by means of the ordinary tests for acidity, we shall arrive at a very different conclusion. Of course, colour indications only show the balance of affinity for an acid or an alkali, as the case may be, of the coloured body. The change from blue to red with litmus only shows that a free acid has turned the red acid out of its combination with an alkali, and the uncertainty of the change with weak acids is

evidence of so slight a preponderance of strength that it required a marked excess to break up the blue salt. This balance of acid strength may be very much affected by temperature and dilution. In a weak and cold solution boric acid has no acid reaction, and borax has been recommended as a means of standardising solutions of test acid. If, however, the borax solution be hot and strong, the boric acid shows a very distinct though indeterminate acid reaction. A colour reaction, therefore, can only show the relative strength of the affinities of the reagents in determining the reaction which causes a change of colour.

As is shown in the paper referred to on the question, in the *Year Book of Pharmacy*, 1894, folio 344, this power of the vegetable alkaloids to bring about a colour reaction varies very greatly.

Phenolphthalein gives no indication of the presence of quinine; the acid in a salt may be titrated as if no alkaloid were present. With litmus as an indicator the point of the formation of the older official salts is very well defined, the reaction is almost as well marked as in the case of the formation of the neutral salt of an alkali, and thus as far as indicators go the sulphate of quinine of the British, American, German, and most other Pharmacopœias is undoubtedly a neutral salt. No indicator appears to show the formation of the soluble salt with any degree of certainty. Litmus gives no indication at all, not even the indefinite change to purple caused by the formation of a bicarbonate, and thus the expression "neutral" salt in the French sense expresses a theoretic expression of its composition and not the result of any colorimetric testing, and it is certainly very desirable to avoid an expression which very often proves very misleading.

With methyl-orange the indications are very indefinite; the neutral point is approximately the soluble sulphate. Messrs. Farr and Wright, in their paper on the titration of alkaloids, speak of the end reaction in an alcoholic solution as almost unobservable, but state that in several instances the results obtained by titration were exactly twice as great as those obtained by weighing.

The curious effect of sulphuric acid in increasing the specific rotation of polarised light by solutions of quinine also point to a marked difference in constitution in the different sulphates. Dr. Hesse (*Year Book of Pharmacy*, page 144, 1874) gives the rotation of quinine as $\alpha_D = -166^\circ$, of sulphate of quinine in alcohol as $\alpha_D = -191.5^\circ$, of the quinine in solution as $\alpha_D = -220.4^\circ$. Of soluble sulphate he found the rotation for the contained quinine as $\alpha_D = -264.3^\circ$, with $7\frac{1}{2}$ equivalents acid $\alpha_D = -264.7$, but with still

greater excess the rotation of the dissolved quinine may reach $\alpha_D^{20} = -287.6^\circ$. It is curious to note that the maximum rotation is not reached immediately on the addition of the excess of acid, but only after the lapse of some time pointing to a slow formation of the tetra sulphate in the comparatively dilute solutions used.

These results point to the existence in solution of the three crystalline salts, but it would seem that owing to some measure of dissociation in the solutions an excess of acid must be present to keep the tetra-sulphate in solution.

Whatever theoretic conclusions we may form as to the composition of the salts of quinine, there is no doubt of the convenience of the nomenclature adopted by the British, German, American, Dutch, and most other Pharmacopœias, which regard the familiar sulphate as neutral and the soluble sulphate as a bisulphate, but in foreign commerce we must always be on our guard against confusion arising from the French nomenclature, to guard against which the Italian Pharmacopœia gives us the following remarkable trio of synonyms: Bisolfato de chinino = solfato acido de chinino = solphato neutro de chinino.

The PRESIDENT said they were much obliged to Messrs. Howard for taking up one of the most important subjects in the Blue-list. He hoped all the members would again look over that list, and see if some other matters could not be taken up and worked off, so that a fresh list might be prepared. This was a subject which Mr. Howard made very largely his own.

Mr. BRODIE said for many years there had been papers written on the subject of quinine, and various opinions expressed by chemists, some considering the same preparation to be tri-basic and others bi-basic. He might suggest that it would be well if the Conference could arrange for the codification of all the information about quinine, so that they might have some idea what it really was. In the preparation of phosphates, for instance, where the alkaloid was used by precipitation there was no attempt at weighing the alkaloid produced. It was only calculated for the theoretic formula in the molecule, and different chemists had different ideas from the amount of alkaloid produced in the sulphate or hypochloride. He had often thought it would be a great benefit to those who experimented with quinine if the information scattered about could be brought together.

The PRESIDENT said he was obliged for the suggestion, which he

was sure would be taken note of. No one was more capable of undertaking this work of codification than Mr. Howard, and he trusted they may have a communication from him on the subject next year. He was sure they would all agree in passing a vote of thanks to Mr. Howard.

Mr. HOWARD said it was exceedingly desirable that the literature on quinine should be codified, but it was rather extensive, and he was afraid that it would be more in the nature of a treatise on the subject than a note for the Pharmaceutical Conference.

The next paper read was a :—

NOTE ON THE MYDRIATIC ALKALOIDS.

By H. A. D. JOWETT, D.Sc.

That some confusion should have arisen in the past regarding this group of alkaloids is not altogether surprising, considering that there was on the market a variety of products designated daturine, duboisine, heavy and light atropine, etc., and that the literature of the subject was in a most unsatisfactory condition. The work of Schmidt and others has, however, removed these discrepancies, and it is now possible to obtain in commerce products of definite chemical composition of a high degree of purity. A paper read by Dr. G. Sharpe at last year's Conference (*Y. B.*, 1897, p. 439) contained several statements and conclusions which are not in accord with our present knowledge of this subject, and in the 1898 B.P. the description and tests of the official members of this group are generally unsatisfactory, and in some cases misleading and inaccurate. I therefore thought that it would not be without interest to the members to contribute a short note on the subject.

As Dr. Sharpe says, the several names which have been used for a mixture of these alkaloids, as daturine, duboisine, light atropine, etc., should be once and for all abandoned, as they only represent a variable product obtained from a particular plant, the composition of the product depending on the process of manufacture, but consisting chiefly of atropine or hyoscyamine. The only alkaloids belonging to this group which can at present be definitely considered as chemical entities are atropine, hyoscyamine, and scopolamine. These are bodies of definite composition, whose chemical and physical properties have been carefully studied. In

addition to these bases pseudo-hyoscyamine, from *Duboisia myoporoides*, isomeric with atropine and hyoscyamine, has been described by Merck, but its relation to its isomers has not yet been worked out.

Atropine.—Atropine can be prepared either synthetically from tropine and tropic acid by the elimination of water, or by isomeric change from hyoscyamine. The alkaloid contained in belladonna root and other solanaceous plants is primarily hyoscyamine, which, during the processes of extraction, precipitation, etc., becomes converted into atropine by the action of the heat and alkali used. Atropine itself is present in only a very small amount, if at all, in these plants. Dr. Sharpe states that "the relationship of these two bases can hardly be said to be understood," but this statement requires a little modification. Though the nature of the isomerism of these two bases is not at present known, their properties are such as to differentiate them sharply from each other, and it is certainly within the ability of the chemist to detect these differences.

The best and simplest test for determining the freedom of atropine from hyoscyamine or scopolamine is its optical inactivity, both the other bases and their salts being optically active. The presence of a small amount of these likely impurities would thus be at once detected. The new B.P., in the tests for atropine and the sulphate, makes no mention of this fact, but it is stated amongst the characters and tests of aconitine that it is dextro-rotatory, which is perfectly true, but the object of this statement is not apparent, as this property is no test of either its identity or purity. Beyond the melting points the B.P. gives no test for the presence of organic impurities in atropine or its sulphate. That of the base (115.5°) is correct for a pure product, but that given for the sulphate (183°) is open to criticism. Will (*Ber.*, 21, p. 1724) gives it as 196° , the U.S.P. 187° , Hesse (*A.*, 271, p. 102), 180° – 181° , Merck 189° – 191° , whilst a salt, proved to be optically inactive, prepared by myself from pure atropine melted at 190° . A good commercial specimen melted at 190° , so that there is no doubt but that the B.P. melting point is too low.

The sulphate can always be obtained quite white, but has generally an amorphous appearance though really crystalline, and here again the pharmacopœial description requires modification. The melting points of the aurichlorides of this group form a very easy way of identifying the alkaloid and also afford some criteria as to its purity. The B.P. recognises these salts and gives the

melting point for scopolamine aurichloride, but by a strange inconsistency not those of atropine and hyoscyamine, where it relies on the appearance of the salt, of which again a misleading account is given. They are best prepared by dissolving the base in excess of hydrochloric acid, then adding auric chloride and crystallising from the hot solution. The B.P. gives an impracticable method of preparing it from an aqueous solution of atropine. The appearance of the two salts is very characteristic; the atropine aurichloride separates first as an oily clot, which solidifies to a crystalline mass, the hyoscyamine salt comes down in brilliant golden-yellow crystals. The melting points are very sharp and separated by 23° . Atropine aurichloride melts at 137° and hyoscyamine aurichloride at 160° . The B.P., therefore, requires in this respect amendment and addition. The insertion of the colour test with fuming nitric acid and potash is quite unnecessary, and as tests for identity and purity of the base and salts I would suggest—

1. Melting point.
2. Formation and melting point of the aurichloride.
3. Optical inactivity.
4. Freedom from ash on ignition.

These tests would ensure a pure product, and one which can reasonably be expected from the manufacturer.

Hyoscyamine.—This base is actually found in many solanaceous plants, including belladonna, scopolia, etc., and not “possibly” as the B.P. states. It is optically active, and can be converted quantitatively by heat or by treatment with alkali into atropine. It is not, however, only an optical isomer of atropine, as lævo-atropine has been prepared synthetically and is not identical with hyoscyamine. It is distinguished from atropine by its optical activity and by the melting point of its aurichloride (160°). The melting point of the sulphate as it occurs in commerce is about 200° , whilst I have found the pure salt to melt at 204° and not, as stated in the B.P., at 206° . I would suggest a melting point of *not lower than* 200° .

Scopolamine (Hyoscine).—This base is found accompanying hyoscyamine in very small quantity (0.03 per cent.) in many solanaceous plants, its chief source being *Scopolia atropoides*. It is distinguished from both atropine and hyoscyamine by several well-marked characteristics, the most important of which are its percentage composition, its products of hydrolysis, and the melting points of its salts, particularly the aurichloride. Lately Schmidt

has shown that it exists in stereo-isomeric forms, differing in optical activity and slightly in melting points, but not in their physiological action.

It is identical with the base called hyoscine, prepared from hyoscyamus seed, but this is not the source of the commercial article, which is preferably called scopolamine. This question has, however, been very recently discussed by Schmidt, Hesse, and Merck, and may be considered satisfactorily settled.

The characters and tests given for the hydrobromide in the B.P. are very unsatisfactory.

The solubility in water (1 in 1) is incorrect. The U.S.P. gave 1 in 1.9, and Hesse gives 1 in 4, which is more correct. The hydrated salt, when heated (in a capillary tube) to 100° , forms a clear liquid, and no alteration can be observed on further heating to 181° (the melting point of the dehydrated salt). The statement in the B.P., therefore, is somewhat misleading.

The melting point of the dehydrated salt as there given (193° – 194°) requires modification. According to Schmidt (*Arch. Ph.*, 236, pp. 47, *et seq.*) the scopolamine hydrobromide of commerce consists of a varying mixture of lævo (or normal) and inactive scopolamine in proportions dependent on the source of the alkaloid and the mode of manufacture. The commercial salt has a specific rotatory power of about -13° , and melts at 181° . The purified lævo salt melts at 193° , and the inactive modification at 180° , but it has been shown that there is no difference in the physiological action of these salts. The tests and characters of the official salt should therefore be given for the pure product as it appears in commerce, which is a mixture of the stereo-isomers, melting at 181° . This is the melting point given by Hesse and confirmed by my own experiments. It would be interesting to know if the compilers of these tests have met with a salt in commerce of the melting point given (193° – 194°).

With auric chloride the salt is stated to give a crystalline salt melting at 198° , which is not correct. As I have previously shown (*J. C. S.*, 1897, p. 679), an additive compound is formed under these conditions of the formula $B \cdot HBr \cdot AuCl_3$, which melts at 215° . The aurichloride, when prepared in the usual manner, melts sharply at 198° , thus differentiating it from atropine and hyoscyamine. There does not seem to be any reason why the salt should not be neutral to litmus, as a properly prepared salt will conform to this condition. The statements of Dr. Sharpe regarding hyoscine and scopolamine show that he has confused these bases,

but if the investigations made in recent years be considered, it will be found that our knowledge of this group of alkaloids is quite definite and satisfactory.

The PRESIDENT said they were much obliged to Dr. Jowett. This paper emphasized a certain point in connection with the Pharmacopœia, to which he had called attention in his address—viz., the advantage of having proof copy before pharmacists and medical men some time before it was issued, so that these little points of importance might have been included and not have left it open to adverse criticism when published.

Mr. MARTINDALE said there was such conflict of evidence with regard to these mydriatic alkaloids even by such authorities as Will, Hesse, Ladenburg, and Merck, that it was impossible to come to any distinct agreement as to what the melting point of some of them should be. The Pharmacopœia Committee, he thought, did not want to commit themselves when great authorities differed so much. As to the so-called amorphous condition of sulphate of atropine under the lens, it could be distinctly seen to be crystalline. With regard to the melting-point of sulphate of atropine, he believed Hesse's authority was taken; but, at any rate, the difference between 181 and 183 was not great. When the greatest authorities and manufacturers as well did not agree on these melting points, the Pharmacopœia authorities could hardly be expected to come to any conclusion.

Mr. SIEBOLD said he should like to make a few observations, not so much with reference to this paper as to one on the same subject communicated to the Conference last year by Dr. Sharp. The paper referred to was entitled, "Our Present Knowledge of the Mydriatic Group," and contained the following passages with regard to the dispute between O. Hesse and E. Schmidt respecting hyoscyne or scopolamine: "E. Schmidt holds the opinion that there is a base scopolamine, and he further makes the startling assertion that the commercial samples of hyoscyne are not hyoscyne at all, but in reality this new base scopolamine. It is passing strange if we have been hitherto using hyoscyne in the firm conviction that it is hyoscyne, and obtaining hyoscyne action with it; and yet Schmidt tells us it is not hyoscyne at all, but scopolamine." A little further on in the same paper Dr. Sharp stated that "after all, this so-called scopolamine may be nothing more or less than an impure atropine or hyoscyamine." He (Mr. Siebold) had not

been present at last year's meeting of the Conference, and he therefore took this opportunity to point out that the passages referred to were far from correct and liable to convey very erroneous impressions. He supposed that by the term "our present knowledge" Dr. Sharp meant the present knowledge possessed by the chemical world in general on the subject in question; but if so, he had given a rather misleading representation of it in the passages referred to. There was absolutely nothing to justify the supposition expressed in the last named passage; and the earlier passage alluded to was certainly calculated to create the impression that hyoscyne and scopolamine were different bodies, which was by no means the case. It could not be too distinctly understood that when Hesse spoke of hyoscyne, and Schmidt of pure normal scopolamine, these two chemists were merely using different names for one and the same substance, viz., an optically active alkaloid of the composition $C_{17}H_{21}NO_4$, contained in both scopol root and henbane. With regard to this point, therefore, the difference between these two investigators was merely a question of nomenclature. It was true that E. Merck had used the term hyoscyne exclusively for the henbane alkaloid $C_{17}H_{21}NO_4$, and the name scopolamine for the pure scopol root base of the same composition; but this was merely done to call attention to the source of the product, for Merck himself admitted the identity of the two products. But while the dispute between Schmidt and Hesse on this part of the subject was narrowed down to one of names, there was a real point of difference between these authors respecting the nature of a second alkaloid of the same composition contained in variable quantities in scopol root and commercial scopolamine. This second base was optically inactive, and was regarded by Hesse as a distinct alkaloid for which the name atropine was suggested by him. Schmidt, on the other hand, believed this substance to be merely an optically inactive modification of scopolamine, such as could be obtained from the normal base by the action of alkalis, etc. Hesse, however, claimed to have established physiological as well as physical differences between atropine and scopolamine (hyoscyne), and therefore insisted upon the individuality of the former. It was this question of atropine, therefore, which constituted the only substantial point of difference between these chemists.

The question as to whether hyoscyne or scopolamine was the more appropriate name for the high rotating alkaloid of the formula $C_{17}H_{21}NO_4$, was one on which a conflict of opinion could be readily

understood. It should be borne in mind that the name hyoscyne was originally given by A. Ladenburg to a henbane base which he believed to be an isomeride of atropine and hyoscyamine, and to which he assigned the formula $C_{17}H_{23}NO_3$. Subsequently the correct formula of the new base was shown by Hesse to be $C_{17}H_{21}NO_4$; and the same result was likewise obtained by Schmidt, who, moreover, showed that this alkaloid agreed in composition and properties with scopolamine isolated from the root of *Scopola atropoides*. The existence in henbane of an alkaloid of Ladenburg's formula, $C_{17}H_{23}NO_3$, had never been confirmed, and was now generally considered as disproved. The perfect identity of hyoscyne from henbane with the pure normal scopolamine from scopol root could now be regarded as fully established, and the only remaining bone of contention appeared to be the choice of a name for the product from either of these sources.

In conclusion Mr. Siebold said that he had entered upon these somewhat lengthy explanations from a desire to remove any possible misconceptions on the subject in question. In his opinion it was important that any one who attempted to guide others in obtaining a clear view of disputed and apparently confusing questions, ought to take care to be thoroughly familiar with the real points at issue and with the entire literature of the subject. He might add that a short summary of the present aspect of the hyoscyne question would also be found in the *Year Book of Pharmacy*, 1896, page 3, and 1897, page 3, and likewise in a paper by L. Merck, an abstract of which was contained in the present (1898) volume of the same work.

The PRESIDENT said they were very glad to have heard the remarks of Mr. Siebold, who was always worth listening to. He took it that when an author spoke of "our knowledge," he meant his own principally, and must not always be taken to include the whole Conference. He was sure they would pass a vote of thanks to Dr. Jowett.

This was unanimously agreed to.

The following six Pharmacopœia papers were then read and the discussion thereon reserved until the afternoon of Wednesday.

The first one was on—

PHARMACISTS AND THE PHARMACOPŒIA.

BY PETTER MACEWAN, PH.C., F.C.S.

Why should British pharmacists trouble about the British Pharmacopœia as we are doing now? The State does not recognise us as fit and proper persons to entrust with the publication of the work, and the General Medical Council, which is so honoured, has not been too eager to take counsel with the representatives of pharmacy in regard to its preparation.

There are few greater anomalies in this country than the British Pharmacopœia. It may first be noted that, although the General Medical Council is by the Medical Acts of 1858 and 1862 constituted the publishers of the book, the Legislature has been careful to give instructions in such wide terms that the Council is not compelled to prepare the work, but "shall cause to be altered, amended, and republished such Pharmacopœia as often as they shall deem it necessary." Under this provision the Medical Council has, since the first British Pharmacopœia was published, excluded any but its own members from final decisions upon what should and what should not be included in the British Pharmacopœia; so that pharmacists, who are best qualified to decide upon pharmaceutical matters, and to whom pharmaceutical standards are of commercial as well as professional interest, have practically no voice in the decisions.

Secondly, we may note that the publishers of the book seem to lack organization for continuous revision—in fact, until they appointed a pharmacist, Dr. John Attfield, as a reporter, there was no provision by the Council for watching the progress of pharmacy and medical treatment so far as such progress affected the Pharmacopœia.

In the third place, we may take it as a fact that the new British Pharmacopœia is chiefly or essentially the work of pharmacists who were appointed by the Pharmaceutical Society of Great Britain to assist the publishers. They did their work well, but I believe I am right in saying that these workers were in such an unsatisfactory position that they could never be sure that their expert opinions would be accepted as final. Which is the greatest anomaly of the whole matter.

In France, Germany, and the United States, the compilation of the national Pharmacopœias is entrusted to representative committees of medical men and pharmacists, with associate helpers. None of these countries, however, strictly compare with our own.

In France the Government of the day selects the committee of revision, placing upon it men of all interests—medicine, pharmacy, chemistry, and botany—but the burden of the work and the greater part of the honour of revising the Codex falls upon the pharmaceutical representatives. The conditions are almost similar in Germany, the *Arzneibuch* Commission being appointed by the Emperor; and here, again, medicine, pharmacy, and chemistry are represented, and veterinary surgery is also recognised. In the United States matters are different. The *Pharmacopœia* of that country is practically a private publication; its authority is like that of our “Unofficial Formulary”—it is tacitly recognised as an authority, but is not by Statute a compulsory standard, although each State in the Union may so decree in its Legislature.

In spite of its unsatisfactory recognition the United States *Pharmacopœia* is revised in a manner little short of perfect. Once every ten years all medical and pharmaceutical associations in the Union send delegates to a Convention held in Washington. The Convention appoints a committee to revise the work. The Nation is recognised by the appointment of representatives of the Army and Navy Medical Services. As constituted, the committee represents all directly interested, but in practice the work is done by pharmacists, some of whom, however, hold medical qualifications. With the publication of a new edition the work of the committee does not end. This committee is so largely composed of leaders from our kindred body, the American Pharmaceutical Association, that year by year preparation for revision goes on by research committees, individual work, and reports on special subjects which small committees have been appointed to consider. The details of the scheme are of great interest, but it would be out of place to epitomise them now. Suffice it to say that they embrace consideration of every branch of the current literature of the world connected with a *Pharmacopœia*, and research on criticisms directly affecting the existing work. Be it noted that all this is done without statutory obligation. The committee are the publishers of the work, and the revenue obtained from it pays the out-of-pocket expenses.

Is it possible for British pharmacists to do something on similar lines? At present, year by year, an immense amount of work is done in our country which bears upon *Pharmacopœia* revision, and, saving the annual report to the Medical Council, which is a clever piece of literary craftsmanship, there is no adequate means of utilising this work. The Pharmaceutical Societies cannot be

expected to look after such things, because their functions are becoming more and more concentrated upon the administrative side of pharmacy. I suggest that the British Pharmaceutical Conference should take the matter up. It represents the British Empire—England and Wales, Ireland, Scotland, Canada, India, and the Colonies. Its object is to improve the practice of pharmacy. It is free from the burden of Acts of Parliament, and especially of official red-tape. It has already in the Formulary Committee given evidence of its ability in Pharmacopœia pioneering. We only require to reorganise the committee to make it suit the purpose. It should be representative—

First, of the more important centres in the three kingdoms, preferably through local pharmaceutical associations.

Second, of the Pharmaceutical Societies of Great Britain and Ireland.

Third, of every pharmaceutical association and society of interest in Canada, India, and the Colonies.

This would form a grand committee equivalent to the American Convention. From it would be appointed a smaller working committee, whose suggestions would be submitted to and voted upon by the grand committee before recommendation to the Conference, with reservations in regard to matters requiring expeditious decision.

The working committee's duties can better be imagined than described. It should be so constituted and have such powers that the director of it should be able to freely instruct or correspond with his colleagues regarding any B.P. subject. It should secure the co-operation of the Pharmaceutical Research Laboratory, and of any similar institution in the kingdom or abroad. There is much assistance latent in the senior pupils of schools of pharmacy, in the laboratories of wholesale houses, and in our university colleges, apart from which there are many young pharmacists who would be only too thankful to apply to a central authority for work to do, if they knew that their assistance would be welcomed. You will all have noticed that the progress of pharmacy is made by potential examiners, who too frequently retire into their scientific coffins when they receive their appointments.

If a scheme of revision such as that I have outlined were carried out, new life would be infused into this Conference, and we should never lack pabulum for our discussions. Beyond which it might be possible for the Conference to publish a more comprehensive work than the *Formulary*—one rivalling the British Pharma-

copœia itself; and, should the time ever come when pharmacists obtained statutory recognition as revisers of the Pharmacopœia, the organisation for the work would be ready.

Finally, pharmacists may well consider whether it is to their advantage to give their services under the present law so humbly to the General Medical Council as they do. I understand that the Council claims that it must adhere to the statute, and that it may not delegate its powers to pharmacists. True, but as the assistance which pharmacists have hitherto given is legal, it would be quite as legal for the Council to give the representatives of pharmacy voting power in the preparation of the work and remuneration for expenses incurred. Perhaps the Pharmaceutical Societies could not insist upon this, since there is a kind of brotherhood between all official executive bodies; but the Societies could say to the Medical Council, "Gentlemen, like yourselves, we have many executive functions to perform, and these practical pharmaceutical investigations which you suggest to us are not in our direct line of work; but the British Pharmaceutical Conference has had a Pharmacopœia Committee working for some time; we are represented upon it. Better try the B.P.C." The Conference would be able to state its terms, and if these were not agreeable to the Medical Council, then let the Council itself carry out its statutory duties without pharmaceutical assistance.

THE GALENICAL PHARMACY OF THE 1898 PHARMACOPŒIA.

By F. C. J. BIRD.

The storm of adverse criticism which greeted the appearance of the last Pharmacopœia in September, 1885, affords a striking contrast to the comparatively mild protests against alleged defects in the formulæ and process of the present volume which have as yet appeared. Nor on this occasion has it been found necessary to mar the reputation of the Pharmacopœia by the publication of a lengthy list of errors and corrections—ample evidence of the greater care and more practical knowledge brought to bear upon the compilation. Processes devised in the experimental laboratory, or at the working bench of the retail pharmacy, must be based on thoroughly sound principles if they are to successfully pass through the ordeal of trial on the manufacturing scale, the true test of perfection in any process. Shortcomings in an official formula may, when small

quantities are concerned, usually be compensated for by dextrous manipulation, but as soon as grammes give place to kilos any error becomes highly magnified, and the difficulty of successfully carrying out the operation enormously increased.

Sufficient time has now elapsed for exhaustive trials of the new and altered official formulæ, and the fact that so few serious faults have been discovered completely raises the labours of the compilers above that reproach of "easy-chair work" which was thrown, perhaps not quite undeservedly, at the last edition of the *Pharmacopœia*.

The objects of the present short paper are to briefly convey a general idea of the influence which the galenic pharmacy of the new *Pharmacopœia* has had upon the work of the manufacturing laboratory, and more particularly to elicit the experience and views of fellow-workers from the retail stand-point in the useful discussion which I trust will follow.

Two apparently incompatible incentives are ever present to those who have control of commercial laboratories, viz., excellence of product combined with economy of production. Even a *Pharmacopœia* cannot afford to neglect these indispensable elements of successful work, and that this has been recognised is evidenced by the fact that some of the most rational and useful of the alterations in official processes are based on the practice of the manufacturing laboratory.

A somewhat revolutionary principle is involved in the omission of a detailed description of processes which can only be conveniently and economically carried out on the large scale. Not so many years ago the man who not only guaranteed the preparations on which his reputation depended, but actually made them himself, was alone considered to be a pharmacist in the highest sense of the word. But as extremes of all kinds are generally bad, the conviction has forced itself upon us that too strict an adherence to the hard and fast lines of ideal pharmacy is fraught with disadvantage. Specialism and division of labour are the tendencies of the age. The conservatism of pharmacy has long and stubbornly struggled against their influence, but the pages of the new *Pharmacopœia* reflect the result of the unequal contest. The pharmacist of to-day is, by education and training, in a position to guarantee the quality of the chemicals and preparations which he vends. Not that he necessarily has made them himself—the traditional pharmacist of a previous generation may have done so—but with confidence in the source of those preparations which he does not manufacture,

supplemented by his own practical knowledge, he may, without diffidence, take the full responsibility of his wares, and continue to occupy that honourable position in the community to which he is justly entitled.

Concentrated infusions, the horror of the pharmaceutic purist, and the theme of many a solemn admonition to the younger generation, have at length insinuated themselves within the pages of our official guide under the guise of *Liquores Concentrati*. Nor on reflection does it seem unreasonable that the same skill and perception of the idiosyncrasies of a particular drug under treatment which enables the pharmacist to prepare a perfect tincture or liquid extract should also aid him to solve, under somewhat different conditions, a similar pharmaceutical problem.

Uniformity is a dominating idea in the revised Pharmacopœia. The greater precision of language and more accurate definition adopted are welcomed in the laboratory, and will do much to prevent that undesirable variation in the physical character of the product of a given formula emanating from different sources which is always likely to occur when the wording of that formula permits of too much latitude in its interpretation.

It will only be possible in the limited space at my disposal to cursorily glance at the more important classes of galenicals and indicate the direction in which they have been affected by official alterations.

Extracta.—The new and altered extracts are, on the whole, a greatly improved class of preparations. Chief amongst them must be mentioned *Ext. Cascar. Sag. Liq.*, the formula of which is in every way an advance on that of 1885. By the new method the bark is completely exhausted (boiling water removes less than $\frac{1}{2}$ per cent. of tasteless extractive from the marc) and the tedious filtration necessary in the old process can now be dispensed with. The addition of the alcohol throws down an almost negligible precipitate, especially if the aqueous liquid has been carefully decanted before the final evaporation, and considering the enormous demand and large scale on which this preparation is made, the new process comes as a boon to the laboratory worker. *Ext. Belladonnæ Alcoholic.*, whilst now possessing the advantage of a standard strength in alkaloid, cannot be regarded as a perfect galenical; in fact, as far as physical appearance is concerned, its claim to the designation of extract is not apparent. If made sufficiently soft to be of a pilular consistence, hardening occurs at the surface, with consequent variation in potency. Evidently a more suitable diluent

is a desideratum. *Ext. Belladonnæ Liq.*: At the Oxford meeting of the Conference it was suggested that repercolation might advantageously be adopted as an official process, and this is one of the instances in which the compilers of the Pharmacopœia have considered it applicable. Complete exhaustion of the belladonna root must not be expected by the process as written, for the condensation of the active principles of 2 lbs. of belladonna root in 12½ fl. oz. of product by following the official directions would tax the ingenuity of the most skilful operator. But the application of heat, which is so detrimental to the colour of the extract, is avoided, and it is always open to the pharmacist to continue percolation (as is usually done) with more menstruum to exhaustion, the weaker fractions being reserved for use in a subsequent operation. Repercolation gives excellent results with *Ext. Sarsæ Liq.*; it might also have been extended to *Ext. Cocæ Liq.* and *Ext. Pareiræ Liq.* *Extractum Ergot.* Ergotin, 1885, was unsatisfactory on account of the indefinite expression "syrupy consistence" which occurred in the formula. Just according to the construction placed upon that expression, so the yield and presumably the activity of the product varied, but such a fault is avoided in the new process, which apparently leaves little to be desired. One of the greatest improvements from a laboratory point of view has been effected in the formula for *Ext. Glycyrrhizæ Liq.* Made in the old way it was a constant source of trouble, for not only might the uncorticated root be employed for the 1885 preparation (to the detriment of the flavour and sweetness), but the proportion of rectified spirit was quite insufficient to prevent fermentation in hot weather, so that it was absolutely necessary to depart from the literal directions of the Pharmacopœia and evaporate to a higher gravity in order to admit an increased proportion of spirit without interfering with the volume of the product. These faults have now been corrected, and the present formula is an admirable one. *Ext. Nucis Vom.*: Standardisation with sugar of milk appears to be successful in this case, as, unlike *Ext. Bellad. Alch.*, there is sufficient evaporated liquid to take up the sugar of milk and at the same time retain the physical characters of an extract. *Ext. Nucis Vom., Liq.*: Here repercolation is inferior to the official method, the whole of the alkaloids being with difficulty removed from the seeds by solvent already partly saturated with extractive matter. Percolation with fresh solvent and distillation as directed easily produce an extract of full strength. *Ext. Ipecacuanhæ Liq.*: The intention of the compilers was presumably to make this a 1 in 1 preparation,

but the alkaloidal standard fixed upon (2.25 per cent.) rarely admits of 16 fl. oz. of extract being obtained from 1 lb. of root. Ext. Pareiræ Liq.: In spite of considerable criticism this process has proved a workable one, and the extract deposits less than formerly. But repercolation would probably have been more suitable, as already mentioned.

The more frequent instruction to "evaporate to dryness," and the introduction of extracts reduced to powder with sugar of milk, are distinct advances in the direction of uniformity, for the operator is now relieved of all doubt as to the meaning of such indefinite expressions as "suitable consistence," "consistence for forming pills," "soft extract," etc., which were of common occurrence in the last Pharmacopœia.

Liquores.—The *Liquores Concentrati* rank foremost in interest amongst the numerous additions to this class. Their insertion marks a change in the official attitude which, by many, has long been regarded as inevitable, for they are introduced as "the result of many experiments made with the object of preparing decoctions and infusions in a highly concentrated state," which should resemble the liquids termed by manufacturers "concentrated infusions and decoctions." The methods given for the preparation of these liquors, although perhaps not so perfect as those followed commercially in the manufacture of concentrated infusions, are on the whole successful, sarzæ co., senegæ, and quassiæ being amongst the best. Some are deficient in keeping properties, and in those formulæ constructed on the model of liq. chiratæ conc. it would seem to be more in accordance with the accepted principles of percolation to direct "that the marc be kept covered with menstruum, and the percolate allowed to flow regularly at such a rate that the whole operation may extend over eight days." Considerable doubt exists as to the manner in which the compilers of the Pharmacopœia intend the *Liquores Concentrati* to be employed. May I suggest that the idea in their minds was that a medical man when writing a prescription would order the official dose of a liquor in place of the corresponding fresh infusion, and I think this view is supported by the statement in the preface that "the products of their dilution may be prescribed by practitioners in place of the corresponding official infusion." Naturally, in a prescription, "Aquæ ad" would give the product of their dilution. Used in this way the *Liquores Concentrati* would neither interfere with the fresh infusion nor with its concentrated representative. Liq. Calumbæ Conc.: Calumba Root is in this formula directed to be twice macerated

and pressed with given quantities of distilled water, the expressed liquids being afterwards heated to 180° F. and mixed with alcohol. The quantity of expressed liquid obtained from a drug like calumba depends on the power of the press, hence an element of uncertainty exists which is likely to cause variation in the product. This could have been minimised by directing sufficient water to be taken for the second maceration to furnish a definite volume of expressed liquid. *Liq. Sennæ Conc.*: The product of this formula does not usually measure one pint, as evaporation during the heating of the liquid, precipitation by the alcohol, and absorption by the filter together tend to make the loss in volume more than the $\frac{1}{2}$ oz. allowed. If the liquid after heating were made up to 16 fl. oz. and the well-drained filter washed, if necessary, with 20 per cent. alcohol to 20 fl. oz. product, greater uniformity would be ensured. *Liquor Thyroidei* is the herald of a new series of preparations which are probably destined to find a permanent place in future editions of the *Pharmacopœia*. Scrupulous cleanliness and perfectly fresh and healthy glands, free from cysts, are absolutely essential for the preparation of a reliable thyroid solution; in other respects the process presents no difficulty if the official directions are closely followed. 5 per cent. phenol solution in conjunction with glycerin is used as a preservative, but it is doubtful whether this is the most efficient that could have been employed.

Spiritus.—The process for *Spiritus Ætheris Co.* involves distillation of a mixture of alcohol and sulphuric acid at a high temperature. Few ordinary pharmacists, unless possessing special facilities, would undertake the risk of this operation, and under the circumstances a modified formula embracing an outline process with characters and tests for oil of wine, and directions for its solution in spirit and ether, would have been preferable. *Spirit Æther. Nit.*: Deficiency of product due to loss of nitrous ether in the old process is now avoided by placing a portion of the alcohol in the receiver, in order to absorb any etherial vapour which may have escaped condensation. A better yield is thus secured which may still further be increased by conducting the distillation under slight pressure as advised some years ago by Mr. E. H. Farr. The apparatus (all joints of which must be quite air-tight) is set up as usual, but a tube led from the receiver is made to dip under the surface of mercury to an extent dependent on the pressure which the retort, etc., will safely stand.

Spiritus Rectificatus.—The change in the strengths of the official alcohols is the most important and far reaching of any that

have affected the characters of the galenical preparations of the new Pharmacopœia. I must confess to not sharing the regret with which the disappearance of proof spirit has been viewed in some quarters. As long as the word "proof" remained on the official page there was always an inducement to use it as a standard of alcoholic strength, but its removal has cleared the way for the more rational, scientific, and infinitely more convenient centesimal system now happily adopted. Long custom and daily contact have rendered the proof standard indispensable to the British Excise; but for pharmaceutical purposes the new method of expressing alcoholic strength has all those advantages over the old which metric weights possess when compared with avoirdupois weights. Forty or fifty over-proof is meaningless to the average mind as an expression of alcoholic strength, whilst the terms 40 or 50 per cent. alcohol at once call up a tangible idea of relative alcoholic value. The ease with which volume-percentage has displaced proof degrees in the routine of the laboratory is surprising, and the compilers of the Pharmacopœia are to be congratulated on having so boldly departed from the beaten track by authorising a system both convenient to work with and widely acceptable. Mixture by weight, where liquids are concerned, is not the general rule of the Pharmacopœia. There are, however, instances in which it has been thought desirable to order liquids in parts by weight; for example, the liquid ingredients of the ointments. This principle, which is particularly applicable when rise of temperature is a consequence of the act of mixing, might, with the view of increasing the usefulness of the formulæ, have been extended to the diluted alcohols and to certain of the diluted acids, for it is obvious that when the components of mixtures have to be measured at 15°·5 C. and the final volume adjusted at that temperature, mixture by weight is in such cases both quicker and more accurate.

Syrupi.—Keen disappointment has been felt at the absence of Syr. Ferri Phosph. Co. and Syr. Hypophosph. Co. These two syrups are manufactured in enormous quantities, but as all makers do not follow the B.P.C. Formulary there is great variation, and authoritative processes for their preparation were eminently desirable. Syrupus Aurantii is improved in flavour by the tincture of fresh peel now used. Syrup. Ferri Iodid. has changed for the better in several respects. The useless and detrimental boiling together of syrup and ferrous iodide solution is omitted, the loss of iodine by volatilisation and absorption in the filter paper, which

formerly rendered it impossible to produce a syrup of full official strength, is now prevented by boiling slightly and washing flask and filter with diluted syrup—practical details of great importance. Although the much needed reduction in the quantity of sugar has been effected, the sp. gr. remains about the same on account of the ferrous iodide having been increased to 10 grammes in 100 c.c., probably to bring the syrup into line with the percentage system of the Pharmacopœia. Formulæ for Syr. Ferri Bromidi and Syr. Picis Liquid., two syrups in very general demand, might usefully have been included. It is disappointing that the faults which have so frequently been pointed out in the process for Syr. Rhei are still left uncorrected. Amongst other defects may be mentioned the wasteful procedure (surely unworthy of the official sanction) of evaporating an alcoholic percolate. Syr. Rosæ, an unimportant syrup, also remains unaltered; it might advantageously have been remodelled on the lines of the U.S.P. formula. Syr. Sennæ: This is a great advance on the old syrup. The senna is "extracted by pressure," by which the greater part of the injurious and lengthy evaporation of the old process is avoided, and a product obtained which, although rather thin, is of excellent appearance and aroma. Syr. Papaveris has been omitted without the provision of any adequate substitute. The undesirability of officially retaining a powerful narcotic like Syrup of Poppies, which is of variable activity, cannot be standardised, and is unfit for medicinal treatment, especially of children, is the alleged reason for its deletion; but although this is certainly consistent with the general principles of the new Pharmacopœia, the preparation in question being extensively used in domestic medicine, will still be manufactured and sold, and it is doubtful if the object of its omission will be attained. The difficulty might possibly have been overcome by introducing, under some such title as Syr. Opii Co., a formula for a similar syrup, based on a standardised preparation of opium. Would the B.P.C. Formulary Committee consider the suggestion?

Tincturæ.—The new and altered formulæ of the tinctures, foreshadowed by the work of Farr and Wright, were finally adopted by the Pharmacopœia Committee of the General Medical Council, after an examination of "some hundreds of tinctures, spirits, etc.," prepared by the Editor of the Pharmacopœia; and the result of the alterations, extensive as they are, has, from a laboratory point of view, proved in most cases entirely satisfactory. Tinct. Aurantii is far superior in aroma to the 1885 tincture. The

objection that has been raised to the use of the fresh peel, viz., that it can only be obtained at a certain season of the year, can hardly have much weight when it is remembered that many other official drugs (poppy petals, green herbs, etc.) labour under the same disadvantage. Tinct. Opii: The well-known faults of the 1885 process have been corrected. The new method is quicker and more easily carried out, exhaustion can be completely effected, and by the final adjustment in strength (a most important improvement) uniformity is ensured. Tinct. Rhei is remarkable for the omission of saffron and replacement of part of the 60 per cent. alcohol by glycerin. It is the only tincture prepared by percolation which contains glycerin. The result, however, is in this instance a decided success.

Unguenta.—Many improvements have been effected in this group. Experience in the use of the paraffin basis inaugurated in the last Pharmacopœia has had its effect on the present formulæ, and generally they may all be said to be highly satisfactory. Variation in colour of certain of the ointments has been prevented by designating the particular variety of paraffin to be used—a much needed provision, which will ensure uniformity in the future. Unguentum Hydrargyri Nitratis apparently still continues an unsolved problem. The formula as it stands does not in all cases give a perfect result, for the ointment is neither of a very good colour when made, nor does it retain its colour for any length of time when kept. Moreover, the high temperature to which the fat and oil are directed to be heated renders the operation a difficult one to carry out, especially on the large scale. A modification of the official process, which yields an excellent product, depends on the fact that lard, either crude or imperfectly oxidised, has a powerful reducing action on nitrate of mercury ointment, whilst olive oil has little or none.

If, therefore, the lard be heated on a water-bath with the nitrate of mercury solution to as high a temperature as possible until reaction nearly ceases, and the olive oil then added, the heat being continued for a short time, a product of excellent colour and consistence will be obtained. This process is more manageable than the official one; by completely oxidising the lard with excess of solution of nitrate of mercury the keeping qualities of the ointment are greatly improved. Ung. Conii: The boric acid is omitted; this ointment now becomes mouldy on keeping.

The assay processes of the new Pharmacopœia have been found to work well in the analytical laboratory. The one for morphine in

opium is now trustworthy and free from error. H. Wilson has shown that in some instances the analytical details may be simplified or shortened, sources of loss eliminated and slightly higher figures obtained; probably with the record of more experience other suggestions will follow. At a certain stage in the nuxvomica estimation, for example, the alkaloid is directed to be precipitated in a stoppered flask, the strychnine ferrocyanide transferred to a small filter, washed, and rinsed into a separator, an operation presenting some slight difficulty with the possibility of loss. A more convenient plan is to precipitate the alkaloid in the separator itself (which must have a capacity of 200 c.c.), having previously inserted a minute tuft of cotton wool in the tube of the separator just above the tap. The precipitate is readily kept back by the cotton wool, on which it collects, and the column of liquid in the tube below the tap accelerates the drawing off of the mother liquor and thorough washing of the precipitate. The cotton wool in no degree interferes with the subsequent part of the process.

The standardisation of so many galenicals calls for increased care and more intelligent application of pharmaceutical principles on the part of the laboratory operator, which, however, have their recompense in the comparatively simple processes now given for those preparations which are based on assayed extracts, etc. It cannot be denied that the alterations and improvements in the galenicals are calculated to render them, as a class, more unvarying in activity and more uniform in physical characters than their forerunners in the Pharmacopœia of 1885, whilst the impression gained by a practical experience of the working of the official processes on the large scale since the day of their publication in May last is that, generally speaking, the galenical pharmacy of the 1898 Pharmacopœia is sound, up to date, and thoroughly abreast of the requirements of modern pharmacy.

THE GALENICALS OF THE NEW PHARMACOPŒIA.

BY H. WIPPELL GADD.

The publication of a new Pharmacopœia inevitably provokes much criticism—some sympathetic, some severe, some savage. Fault-finding is proverbially easy, and grumbling the prerogative of Englishmen, whilst no patriotic Irishman is happy without a grievance.

On the other hand, it is manifestly unfair to condemn hastily products or processes which have been put forward by a body of experts after long deliberation and much experiments.

In these notes it is my object not so much to criticise as to bring forward points and apparent difficulties which have been noted in the course of manufacturing work, in the hope of provoking a good discussion rather than of imparting information.

In the first place, it would appear that in spite of the small quantities named in its processes, its lordly indifference to the needless dissipation of spirit, and the undoubted orthodoxy of its compilers, the Pharmacopœia of 1898 is essentially a wholesalers' Pharmacopœia.

That is to say, the stringent nature of its tests, the number of spirits of varying strengths employed in its processes, and its insistence on standardisation will make it more and more difficult for the official galenicals to be made economically and efficiently on the small scale. This being so, it is surely not too much to ask that those whose products will be examined, not by an ignorant public, but in the fierce light which comes from the coloured carboys, should know exactly what is required of them, and what body is better able to interpret the official directions than this Conference?

To mention the solvents first, it is satisfactory that, the tests being more stringent, "engine waste" can no longer be described as "aqua distillata." The changes in alcoholic strengths, which at first appeared revolutionary, present no great difficulty in practice, and as the drugs are doubtless better exhausted they may be looked on as advantageous.

Of the new and altered preparations I have made notes concerning the following:—

Effervescent citrate of caffeine.—A satisfactory formula, its only drawback being that the strength (4 per cent.) bears no simple relation to the dose.

Resin plaster.—The directions for melting each ingredient separately are impracticable in the case of the soap.

Extracts.—Liquid extract of belladonna, which is the basis of all the belladonna preparations, with the exception of the green extract.

The pharmacopœial process is not altogether satisfactory, as it has been shown by Bryant that it does not exhaust the alkaloidal strength of the root.

The latter's process, however, materially alters the appearance

of the extract, which difference is particularly noted in making the official ointment.

And here I should like to call your attention to some samples of belladonna extract met with in commerce, all of which are guaranteed to be B.P. 1898, but which show striking variance in physical characters.

The solid extract is made from the liquid by evaporating, adding sugar of milk and then further concentrating, a process not free from difficulties, and which becomes objectionable when the extract is used for making suppositories.

For the latter, I would suggest that, instead of taking 18 grains of the solid extract as the Pharmacopœia directs, 30 minims of the liquid extract be taken.

I submit samples made by the two methods. With regard to the ointment, it has already been pointed out by Umney that it would be better to evaporate the liquid extract to a quarter instead of an eighth of its bulk. The standardised liniment is also advantageous, but its logical outcome, the standardised methylated liniment, savours somewhat of a *reductio ad absurdum*.

Liquid extract of ipecacuanha, with its products, the official vinegar and wine, are things to be thankful for, the only drawback being that whilst the Carthagen root is not sanctioned, there is nothing in the estimation process to show the nature of the total alkaloids and consequently the source of the drug employed.

The liquid extract of nux vomica being estimated for strychnine only, and the consequent alteration of the strength of the solid extract and tincture, are very important points. I have found the separation of the strychnine and brucine by means of potassium ferrocyanide difficult.

No amount of washing appears to free the precipitate absolutely from brucine, whilst the bitter taste persists in the filtrate. Prolonged washing, moreover, causes a considerable diminution of weight, with a probable loss of strychnine. Would not a reprecipitation process, as suggested by Dunstan and Short in their original paper, be better? I should much like to hear the experiences of others in this connection.

Extract of strophanthus is curious as being made by successive percolation with ether and alcohol (90 per cent.), whilst percolation with alcohol (70 per cent.) alone suffices for the tincture. Concerning the remaining extracts little need be said, except that it would be well if the directions evaporate "to a soft extract," "to

dryness," "to a firm extract," as the case may be, could be replaced by directions to concentrate to a given weight.

Ext. coloc. co. and extract of cascara sagrada would be better in the form of powder.

With regard to extract of Calabar bean, the product will vary in accordance with each manufacturer's idea of what is "a very soft extract."

This is a matter of some importance with so potent a drug, and I would suggest that a similar process to that for extract of strophanthus, in which the final product is directed to be of a definite weight, would be preferable.

Glycerine of boric acid, when made by the Pharmacopœial process, turns pink, and I would suggest the following modification of the process. Heat the whole of the glycerin in a weighed porcelain dish to a temperature not exceeding 302°F, and add the boric acid in portions, constantly stirring. When all is dissolved maintain the temperature of the liquid, frequently stirring, until the mixture has been reduced to the weight of twenty ounces. This amended process gives a good result.

Perhaps one of the best features of the new Pharmacopœia is the use of metric equivalents, but compromises are always unsatisfactory, and one's loyalty to the decimal system is somewhat strained by the awkwardness of the concentrated liquors 1 in 10. This is, however, more a point for dispensers than manufacturers.

The amount of menstruum ordered in making liq. calumb. conc. is quite inadequate, whilst the maceration and pressure method, which has obvious disadvantages for this drug, does not yield a better result than slow percolation alone.

The process by which the concentrated solutions of chiretta, cusparia, krameria, quassia, rhubarb, senega, and serpentary are prepared is elaborate and troublesome, but does not exhaust the drugs.

As it is not possible to make liq. hamamelidis on this side of the Atlantic, it would have been better if characters and tests had been given instead of a process of manufacture.

Liq. sarsæ co. conc.—If the mixed infusion and decoction be concentrated to 16 fluid ounces a pint of filtered product cannot be obtained. It should be concentrated to 18 fluid ounces.

The powders, with the notable exception of aromatic chalk powder (from which the saffron is deleted), are little altered, but it may be noted that the trade custom of using decorticated liquorice for compound liquorice powder is now officially enjoined.

Of the syrups, *syr. ferri. phosphatis cum quinina et strychnina* is unsatisfactory, the precipitation process giving a much better product.

Syr. cascaræ aromat. is not an elegant preparation, as it quickly deposits.

Syrup of lemons, containing as it does a strong tincture of the fresh peel, is a decided improvement.

It seems a pity that specific gravities are not given for the syrups, forming, as they do, useful and ready tests.

The tinctures are the class of galenicals which have been subject to most alterations, on the whole with satisfactory results. It may be doubted, however, if a slight improvement in flavour and a possible reduction in the price of marmalade are worth the trouble caused by the preparation of tincture of orange from the fresh peel. Here again the indirect result is to take the manufacture out of the retailer's hands.

If medicine requires tinctures of uniform strengths and doses, pharmacy can supply them, and has no cause to complain, but the changes in those made from potent drugs should be notified as widely and as fully as possible.

These are briefly:—Tincture of aconite, two-fifths the strength of the 1885 tincture; tincture of belladonna, about double the strength of the 1885 tincture; compound tincture of chloroform and morphine, four times the strength of hydrochloride of morphine, and a totally different preparation; tincture of *nux vomica*, nearly twice the strength of the 1885 tincture; tincture of *podophyllum*, nearly double the strength of the 1885 tincture; tincture of *strophanthus*, only half the quantity of drug is used, but being better exhausted the potency may not be very different. It would be interesting to have results of analyses of the last-named tincture.

With regard to the compound tincture of lavender and also the spirit of lavender, it has been noted that foreign oils are not now excluded from the *Pharmacopœia*, but as it is difficult to obtain an *ol. lavand. exot.* which conforms to the official tests, the concession does not appear to amount to much.

Tincture of rhubarb without saffron differs so little from the old tincture that this economical change would appear to be an unmixed blessing. Concerning the tinctures as a whole, it seems a pity definite characters such as specific gravities, or amount of extractive are not given, where more exact standardisation is not feasible.

The lozenges are hardly galenical preparations, but it may be noted in passing that trochischi acid. carbolici appear to be excessively strong.

Of the ointments, the process for that of nitrate of mercury is a decided improvement.

Paraffin ointment has been complained of, but the allowance of variance in accordance with temperature meets this objection.

Ung. staphisagriæ would be better made from the oil.

In the wines, the test for freedom from salicylic acid is useful, and the great improvement in ipecacuanha wine has already been noted.

Viewing the galenicals as a class, I cannot but consider that the new Pharmacopœia is in advance of the previous ones, the weakest point being the processes, and one wonders if in some future book, when pharmacy approximates more closely to an exact science, and the present tendency towards factory-made preparations has advanced still further, the galenicals may be treated as the chemicals are now, processes being omitted and tests extended.

THE CHEMISTRY OF THE 1898 B.P.

By P. KELLY, PH.C.

My object in reading this paper is with a view to inaugurate a discussion on the chemistry of the new B.P., and thereby elicit the opinions of the members of the Conference which may tend to the mutual benefit of all concerned.

It is held by some that the Pharmacopœia is not intended to be a teaching book. To my mind it cannot be separated from that object, and, moreover, that it is not only a teaching book, but one that we all should look to both as a standard in scientific work, as well as a standard in manufacturing operations, and so should be the guide-book alike both of the youthful apprentice, without a thorough knowledge of which he cannot either become a competent assistant or a successful candidate at his examinations; and to the matured pharmacist it should be the chart by which he is expected to steer, the guide-book of his every operation, to produce substances in keeping with the standard of its requirements.

Now, this being so, how necessary it is that its contents should enlighten us as to the best methods for the detection of, or exclusion of, suspected impurities; that the tests used for this purpose

should be the most reliable known, and the directions for their application should be explicit, thoroughly practical and free from laxity.

Let me first draw your attention to the atomic weights of the elements, which to me seems the most radical change in the whole volume, as it affects every chemical substance in it, altering the molecular weights of all chemical compounds contained in it, and in this way it is accountable for the most numerous, if not the most important, changes, every one of them being altered, with the exception of that one, to alter which, as it is the standard, would destroy unity, and upset the bases upon which we work: I mean the platform constructed by Dalton, the atomic theory, and I allude to hydrogen.

The cause for such sweeping alterations, I suppose, must be due to the scientific progress in the method of determining them.

But passing on from hydrogen, all the remainder are, like the ladies, growing younger every year.

Now take antimony. Before 1885 its atomic weight was 122; in 1885, 120; and in 1898, 119; and so with them all, that one does not know where they will stop, and begins to fear for the stability of the periodic law (as I believe the discovery of argon has even puzzled Mendelejeff himself).

And so one is surprised at the diversity of opinion which exists between the most expert experimenters with regard to the atomic weights of the elements.

Then with regard to the introduction of structural and constitutional formulæ, I would say, from a scientific point of view, it is well to give us an idea of the internal arrangement of the atoms in organic compounds, which enable us for one thing to account for the different physical and chemical properties of isomeric bodies. Yet from a practical point of view I would say the empirical formulæ would be less strain on the memory and more useful for writing equations.

For instance, take oleic acid. The empirical showing its monobasic character would be $\text{H} \cdot \text{C}_{18} \text{H}_{33} \text{O}_2$, whilst its constitutional would be $\text{C} \cdot \text{H}_3 (\text{CH}_2)_7 \text{C} \cdot \text{H} : \text{C} \cdot \text{H} \cdot (\text{C} \cdot \text{H}_2)_7 \text{C} \cdot \text{O} \cdot \text{O} \cdot \text{H}$.

I consider these complex formulæ, which are wrapped up in so much mystery, or at least theory, should be left to the writers of scientific text-books, and for practical purposes use the empirical formulæ only in the B.P.

I consider the changes in nomenclature is an improvement, especially the acids being now expressed as salts of hydrogen, as

sulphuric acid, now termed hydrogen sulphate, and the hydrates, now termed hydroxides, is a decided step forward.

With regard to inorganic acids, there are a few changes in them, notably acid hydrobromic dilute, which is now prepared, or, as the B.P. says, "may be obtained," by the distillation of potassium bromide with concentrated phosphoric acid, which I consider a great improvement on the '85 process, viz., with bromine and hydrogen sulphide, and also on the Fothergill process; its strength is determined volumetrically by vol. sol. silver nitrate, and by vol. sol. of sodium hydroxide. There are three methods by which sulphurous anhydride may be obtained, viz., combustion of sulphur in air or oxygen, boiling sulphuric acid with copper, mercury, or carbon. The first three are new in the B.P.; the sulphuric acid plus carbon is the '85 process, which, being faulty, might be left out.

Amongst organic acids, citric gets the lion's share of attention, and deservedly so, as it is used so much in medicine and also for domestic purposes. There are several tests to detect impurities and two tests to detect tartaric acid which you would scarcely expect to find now as an adulteration, the commercial value being so nearly equal. Tartaric acid has also an increase of tests, one a very pretty reaction. I mean where you take a solution of tartaric acid to which you add a drop of solution ferrous sulphate, and a few drops of hydrogen peroxide, and solution of potassium hydroxide in excess, which gives a very pretty purple or violet colour.

The mirror, or reduction test (as there are so many organic bodies which produce similar results), I would be inclined to dispense with. Phenol, commonly called carboic acid, has also its alterations, especially its boiling and melting points. Salicylic acid is also slightly changed in its mode of preparation, also its melting point, and a new test (uranum nitrate) is introduced to detect or exclude carbolates and sulpho-carbolates.

In a short paper like this it is impossible to deal at any length with the numerous changes in constants, and the increased number of tests which involve an increased number of reagents.

The standardisation of the preparations of potent drugs, such as extracts *nucis vomicæ*, *belladonnæ*, *ipêcacuanha*, as to their alkaloidal strength, is both from a therapeutic and chemical point of view a great improvement.

This should be valuable information to the medical man who prescribes according to the B.P.

That the 1898 B.P. is an improvement upon its predecessors (in many respects) is unquestionable, especially in its chemistry. Yet there is still room for improvement, and though in the preface the onus is thrown a good deal on the one hand on the prescriber, and on the other on those who are supposed to be duly trained, thus ridding the editor of almost all responsibility from the position the book occupies, this cannot be. If you are to be obedient to its dictates it should supply you with the necessary information to carry them out. I do not think this has been done in the part devoted to the preparing of the volumetric solutions.

Comparing it with '85 B.P., there are still six in number, sulphuric acid being substituted for oxalic. All the molecular weights of the substances used are altered on account of the alteration in the atomic weights but potassium bichromate, which is completely altered, its molecular weight being now 292.3, as compared with 295, and 4.87 grammes dissolved in 1,000 c.c. instead of 14.75 grammes in 1,000 c.c., which was in the '85 B.P.

The change is an improvement; but what I consider cause for complaint is, those changes are not even alluded to in any way, footnote or otherwise. There is no information as to the use of indicators, except in the case of thiosulphate of soda solution where you are told to use mucilage of starch.

Now on page 8 of the preface you find written that it is desired that the B.P. should afford to the members of the medical profession and those engaged in the preparation of medicines throughout the British Empire one uniform standard and guide, whereby the nature and composition of substances used in medicine may be ascertained and determined. This is why I say standard strength should be explicitly stated, and so be what an authorised book should be—a guide alike to the youth learning his business, as well as to the duly-trained chemist. And as it is assumed that the chemistry of the 1898 B.P. is the emanation from (shall I say) the blended brains of practical English and Scotch chemists, should we have any hesitation in expecting it to be a standard in scientific manipulation, and if such is not the case, might I suggest that it was due to the need of the presence of an Irishman in their deliberations?

THE CHEMISTRY OF THE PHARMACOPŒIA.

BY ARTHUR L. DORAN, PH.C., M.P.S.I.

The request to write an introductory paper on the chemistry of the British Pharmacopœia, for Conference, was received early in July with mixed feelings. For, on the one hand, was it not a pleasant proof that all the leaders of pharmacy in the adjacent island did not endorse the opinion so recently expressed post-prandially and euphemistically by a well-known English professor to the President of the Pharmaceutical Society of Ireland? For which see, *mutatis mutandis*, Nathanael's reply to Philip. And again, on the other hand, it is equally plain that so soon after publication there are only two kinds of critics adequate to the proposed task—the purely professional chemist engaged constantly in devising, testing, and teaching processes, hence fully cognisant of the historical data of any given question; and the technical chemist in the wholesale laboratory, whose science, though not necessarily less pure than that of the former, is often limited by the exigencies of commercial dispatch and by a less ample dower of apparatus.

It is surely to be regretted that the wholesale houses on this side of the water are so neglectful of similar work, of which it may be at once stated that it is not only an ethical duty, but also a business investment of the soundest character. In some of the criticism already published one may be excused for detecting an apparent desire to say something detrimental at an early date rather than the better part of selecting for commendation undoubted advances and improvements on the previous edition. In general, we may say that the chemistry of the new B.P. presents nothing particularly novel, and has been familiar to most of us for a long time, although a good deal of it escaped incorporation in the revision of 1885. Changes in chemical nomenclature and a militant metric system becoming triumphant—indeed, reigning alone in the purely scientific work—were to be expected, while the deletion of technological matter, removal of common reactions to the appendix, and adoption of a principle of limits for purity tests, are natural results of having so illustrious a triad of “referees,” one of whom we delight to honour as *homo clarissimus Dublinensis*.

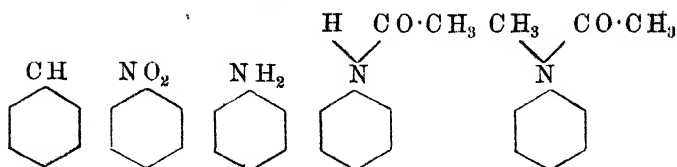
I cannot agree with the strictures that have been passed to the effect that the instructions given for testing are superfluous to the trained analyst and insufficient for the tyro. The chemical in-

structions of the B.P., I take it, are intended for the average man who may well need a mnemonic, be he an M.D. some time removed from his College course, or a chemist made in the Square or at Mount Street. It should be remembered that in the vast majority of cases it is good negative evidence alone that will be requisite, and that if impurity or adulteration be indicated it will have to be proved by more than one method, and for this long apprenticeship to the science together with considerable aptitude will as a rule be necessary.

The introduction of reasonable standards of purity, conforming to good commercial specimens, is of the greatest importance at a time when the usage of citing the B.P. as a legal standard under the Foods and Drugs Act has become well-established. In so comprehensive a work as the B.P., doubtless after a time some of the standards adopted will be found open to objection and in need of revision, and it is especially here that I think the services of many able and willing pharmacists throughout the United Kingdom might be enlisted to work, either alone or in conjunction with a local association in such a manner that a maximum number of observations and determinations would become available on such questions arising.

As an example may be mentioned a recent experience of my own in the case of a newly-introduced compound—bismuthi salicylas. Of a number of specimens examined, not one failed to give more or less violet coloration when test solution of ferric chloride was added to the 90 vol. alcohol washings. One specimen was so grossly impure that salicylic acid was deposited on the funnel during filtration, and I merely mention this to draw attention to the fact that the therapeutical reputation of this chemical would necessarily be ruined by such a mixture.

By the statement in the Preface—that constitutional formulæ are given rather than empirical for organic chemical substances, and that the revisers were only stopped short of graphic representation by the limitations of page area—attention is obliquely drawn to the great importance of these latter, constituting as they do a chemical shorthand that not only informs one of their probable chemical behaviour but in many instances of their physiological action. A single example must suffice of the way in which these formulæ must be applied to working out an answer to such a question as "What is exalgine?" Diagrammatically thus:—



and recollecting that it is a characteristic of amidogen substituted derivatives of the aromatic group to exhibit antipyretic properties, we see why the second last of these compounds finds a place in medicine. Moreover, the substitution of an alkyl group, particularly methyl, in the amidogen powerfully modifies the properties of the compound in the direction of conferring analgesic power, hence we expect and find that exalgine or methyl acetanilide possesses such power. And every correct inference of this sort is a step nearer to that great object of modern chemistry—the synthesis of bodies possessing properties previously determined on.

I beg to close this cursory review of impressions and convictions with the hope that in any future Pharmacopœia revision the General Medical Council will pursue still further the wise and dignified policy of delegating detail work to the hands best suited to properly execute it, being mindful of the Napoleonic dictum, *La carrière ouverte aux talens*, so that we may come to possess at last a work resting firm and unassailable on the triple support of expert, commercial, and officinal knowledge.

A NOTE ON THE BOTANICAL NOMENCLATURE OF THE BRITISH PHARMACOPŒIA.

BY G. CLARIDGE DRUCE, HON. M.A. (OXON), F.L.S., ETC.

The botanical names for the plants yielding the various drugs which are included in the British Pharmacopœia have in some cases undergone alteration from those employed in the last edition, but the changes in almost all cases are made in the right direction, and the compilers are to be heartily congratulated on the result of their labours. The selection of the names is evidently based on the law of priority of publication, and the date 1753 (which I suggested in the *Pharmaceutical Journal*, March 26, 1892, p. 789) appears to be taken for the citation of both genera and species, this has a distinct advantage over the dates of the publication of

Linnæus *Systema* of 1735 and of the first edition of the *genera* of 1737.

In a few instances it appears to me that the law of priority has not been complied with, and I venture to point them out, rather with a view to elicit the reasons which led to the choice of the names employed than to claim absolute authority for those which are here suggested.

Citrus Aurantium, var. *Bigaradia*, Hook. fil., is now adopted for the bitter orange. May I suggest that Linnæus, in his first edition of the *Species Plantarum*, described it as *C. Aurantium*, and gave as a var. *b*, the sweet orange, so that it appears *C. Aurantium*, Linn., would have been sufficient to distinguish the bitter orange. If a name exclusively referring to it were needed, it would seem that *C. vulgaris*, Risso (published in *Ann. Mus. Par.*, xx., 1813, p. 190) has precedence over *C. Bigaradia*, which appears to have been first published in Loiseleur's edition of Duhamel's *Traites des Arbres et Arbustes*, vol. vii., 1819, p. 99.

Araroba.—According to strict priority the name *Andira* is superseded by Aublet's genus *Vouacapoua*, published in the *Histoire des plantes de la Guiane Française Suppl.*, p. 9, t. 373 (1775), while Lamarck's genus *Andira* only dates from the *Encyclopédie Méthodique*, vol. i. (1783), p. 171. In the *Revisio Generum Plantarum*, Otto Kuntze chose Aublet's name, but altered the spelling to *Vuacapua* in order to bring Aublet's vernacular name closer to classical rule. Since other vernacular names are adopted, with the spelling unchanged, in the *Genera Plantarum* of Bentham and Hooker, it would appear better, assuming that Kuntze is correct in his statement that Aublet's genus is valid, to follow the original spelling and write *Vouacapoua Araroba* (Aguiar).

Balsamii Peruvianum et Tolutanum.—The generic name *Toluifera* of Linnæus' *Species Plantarum* of 1753 (which he also used in the *Materia Medica* of 1749 and his *Genera* of 1742), has precedence over *Myroxylon*, which appears to have been established in 1781 by the younger Linnæus in his Supplement. I would suggest the name *Toluifera Pereira*, Baillon *Hist. Plantes*, vol. ii. (1869), p. 383, and *Toluifera Balsamum*, Linn. *Sp. Pl.*, p. 384 (1753), for the plants yielding Peru and Tolu balsam.

Gamboge.—The original spelling of the gamboge plant in the *Journal of the Linnean Society* for 1875, vol. xiv., p. 485, was *Garcinia Hanburyi* not *Hanburii*.

Capsicum.—Flückiger and Hanbury say that Farr has ascer-

tained that the official plant is identical with *Capsicum frutescens*, Linn., *Sp. Pl.*, p. 189 (1753). If this be the case, should it not be substituted for the name *C. minimum*, Roxb.? There is also a *C. minimum* of Blanco from the Philippines, which appears to be a different species. The fact that the plant referred to in the *Hortus Cliffortianus* by Linnæus is not identical with *C. frutescens* of the *Species Plantarum* does not appear to be a sufficient reason for rejecting the latter name.

Catechu.—In this case there is an earlier name which was given to the genus *Catechu* by Aublet in the *Histoire des Plantes de la Guiane Française* of 1775, p. 177, t. 68. Otto Kuntze in the *Revisio Generum Plantarum*, vol. i., p. 201, took up Aublet's genus, but, as in the case of *Vouacapoua*, altered the spelling to *Uruparia*. Schreber's genus *Uncaria* only dates from the *Genera* of 1789. Assuming that Aublet's publication is valid, our plant should be *Ouroparia Gambier* (Roxburgh) = *O. Gambir*, Baill., *Hist. Plantes*, vol. vii., p. 350.

Cimicifuga Racemosa, Elliott.—The date of the publication of *A Sketch of the Botany of South Carolina and Georgia*, where this plant is mentioned by Elliott, is 1824 (see vol. ii., p. 16), but the *Kew Index* gives an earlier authority, namely Nuttall's *Genera of North American Plants*, vol. ii., p. 15 (1818).

Copaiba.—The name of the genus of plants yielding our drug is given as *Copaifera*, which dates from the second edition of the *Species Plantarum*, which was published at the end of 1762 or the beginning of 1763. In 1760, however, Jacquin in the *Enumeratio systematica plantarum, quas in insulis Caribæis vicinæque Americæ Continente detexit novas*, gave the name *Copaiva*. Should this be a valid publication the official plant will have to be called *Copaiva Landsdorfii*, Desf. in *Mém. Mus. Par.*, vol. vii. (1821), p. 377. Among the other species yielding copaiba are *Copaiva officinalis*, Jacq. *l.c.*, p. 21 (1760); *Copaiva coriacea* (*Mart. Reise Brasil.*, p. 285); *Copaiva guyanensis* (Desf. in *Mém. Mus. Par.*, vol. vii. (1821), p. 376); *Copaiva multi-juga* (Desf., *l.c.*), rests on rather uncertain identity, since it is said a fragmentary specimen only exists.

Cusso.—In the *Pharmacopœia* of 1885 the name *Brayera anthelmintica* was displaced by that of *Hagenia abyssinica*; now the former name is restored, but I fail to see the reason. Bruce first described the plant in his *Travels in Abyssinia*, vol. v., 1790, p. 22-3. In the text it is called *Banksia abyssinica*, but on the plate dated December 1st, 1789, it is spelt *Bankesia*. The name,

whichever spelling be followed, is invalid, owing to there being an earlier genus, *Banksia* in the Proteaceæ. In the *Systema* of 1791, p. 613, J. F. Gmelin therefore named the Cusso *Hagenia abyssinica*, and this name was adopted by Willdenow in the *Species Plantarum*, vol. ii., p. 331, of 1799. The earlier *Hagenia* of Mönch is not a competing name, since it is now sunk in *Saponaria*. The genus *Brayera* was not established by Kunth until 1824, when he published it in Brayer's *Notice sur une Nouvelle Plante de la Famille des Rosacées*. In passing I may say that Bruce spelt the name of the drug "cusso."

Filix-Mas.—The name of the male fern is given as *Aspidium Filix-mas*. In most works on English botany *Lastrea* is the name used for the genus, and this was established by Presl in 1836 as distinct from *Aspidium*. The oldest name for the genus appears to be *Dryopteris*, which was used by Adanson in vol. ii., p. 20, of his *Famille des Plantes* of 1763, and where he diagnoses the genus. Our plant is *Dryopteris Filix-mas*, Schott, *Gen. Fil.*, sub. t. 9 (1836).

Fœniculi Fructus.—The name *Fœniculum capillaceum*, Gilibert, *Flora Lituan.*, vol. ii. (1782), p. 40, is retained, but the oldest name is *F. vulgare*, Miller, *Gardener's Dictionary*, ed. 8 (1768).

Menthol.—*Mentha arvensis*, D.C. is stated to be one of the plants yielding it, but the authority for *M. arvensis* is Linnæus in the *Species Plantarum* of 1753, p. 577, not De Candolle. *M. piperita*, Smith, should be cited as of Hudson, since he described it in the *Flora Anglica* of 1762, long before Sir J. E. Smith. Linnæus also gives a *Mentha piperita*, but there is some doubt as to the exact identity, since Sir J. E. Smith says it is represented in the Linnean Herbarium by a form of *Mentha aquatica*.

Myrrha.—It is a pity that the name *Commiphora* which is adopted by some continental pharmacopœias for the plant yielding myrrh should not have been chosen, since it was established by Jacquin in the *Plantarum rariorum horti cæsarei Schonbrunnensis descriptiones et icones*, vol. ii. (1797), p. 66, and has considerable priority over the name *Balsamodendron*, which was not founded until 1824 by Kunth in the *Annales Sciences Naturelles*, sér., i., vol. ii., p. 348. The name of the myrrh plant is *Commiphora Myrrha*, Engler, in D.C. *Mon. Phan.*, vol. iv., p. 10.

Oleum Menthæ Viridis.—In the first edition of the *Species Plantarum*, the spearmint was described by Linnæus as *Mentha spicata*, var. *viridis*. In the second edition of 1762, he gave it specific rank as *M. viridis*. Meanwhile, Hudson, in his *Flora*

Anglica, had previously described it as a species under the name *M. spicata*. It is a question, therefore, whether the name should not be *M. spicata*, Huds.

Oleum Rosæ.—The authority for *Rosa damascena* is not Linnæus but Miller, who first described it under that name in *Gardener's Dictionary*, of 1768.

Pareiræ Radix.—The name of the plant is given as *Chondrodendron tomentosum*, but it is spelt, against etymological rule, *Chondodendron* by Ruiz and Pavon in the *Syst. Veg.*, p. 261.

Quillaia Cortex.—The specific name should be spelt with a capital, as *Q. Saponaria*, as should *Citrus Medica*.

Sinapis Nigræ Semina.—The name of the black mustard is given as *Brassica nigra*, Koch, which was founded in Roehl's *Deutsch. Flora*, ed. 3, vol. iv., p. 713, of 1833, but Roth, in his *Manuale* of 1830, vol. ii., p. 957, had previously called it *Brassica sinapioides*, and until British botanists accept the permanence of the specific names as a rule of nomenclature, the latter name should be adopted.

The Conference then adjourned for luncheon.

On resuming, the following note was read by Mr. Ransom, in the absence of the author.

A SHORT NOTE ON LIME WATER.

BY E. J. EVANS.

A few experiments were attempted with the above subject in view of the late prosecutions under the Foods and Drugs Acts.

1. Lime water was made with 2 oz. slaked lime to the gallon, and allowed to stand 24 hours.

100 c.c. of this solution filtered required 49 c.c. N/10 vol. HCl.

2. Lime water made with the same quantity of lime hydrate, but the lime washed with a little water previous to using.

100 c.c. filtered required 49.5 N/10 vol. HCl.

3. Ordinary shop solution.

100 c.c. required 48 c.c. N/10 vol. HCl. This solution had been kept about a month in contact with the slaked lime.

4. No. 1 solution kept in a flask covered with a chip box lid in contact with the excess of lime for a week and then tested.

100 c.c. required 47.5 c.c. N/10 vol. HCl.

5. No 2 solution was kept in a flask covered with a funnel, in contact with the excess of lime.

100 c.c. required 48 c.c. N/10 vol. H Cl.

6. Lime water was made with water to which 16 grains of MgSO_4 per gallon had been added.

100 c.c. required 50.7 c.c. vol. N/10 H Cl. A week later 100 c.c. required 50.5 c.c. vol. N/10 H Cl.

7. Lime water made by water containing 16 grains of alum to the gallon.

100 c.c. required 50.2 c.c. N/10 vol. H_2Cl . A week later 100 C.c. required 50.25 c.c. N/10 vol. H Cl.

8. Lime water made with freshly made slaked lime, and tested fifteen minutes after mixing.

100 c.c. required 51.0 c.c. vol. N/10 H Cl.

9. No. 8 solution after fifteen minutes longer.

100 c.c. required 51.7 c.c. N/10 vol. H Cl.

B.P. requirement—

100 c.c. require 41.7 N/10 H Cl or H_2SO_4 .

10. Lime water made with water contain 1/10 vol. of CO_2 .

100 c.c. required 49.0 c.c. N/10 H Cl vol.

11. Lime water made with water contain $\frac{1}{2}$ vol. of CO_2 .

100 c.c. required 39.0 c.c. N/10 vol. H Cl.

Two ounces of lime hydrate is too large a quantity to use if the lime is fairly pure.

Theoretically 96 grains or 6.2 grammes would be required.

Experiments with and tested an hour after :—

(a) Solution 72 grains to gallon required 30 c.c. vol. N/10 H Cl per 100 c.c.

(b) Solution 96 grains to gallon required 37 c.c. vol. N/10 H Cl per 100 c.c.

(c) Solution 120 grains to gallon required 40 c.c. vol. N/10 H Cl per 100 c.c.

After twenty-four hours 41.5 c.c. N/10 vol. H Cl. per 100 c.c.

(d) Solution 144 grains to gallon required 43.0 C.c. vol. N/10 H Cl per 100 c.c.

After twenty-four hours, same.

From these experiments it would seem that lime water can be made in a few minutes, if a fairly pure caustic lime be recently slaked before using. Also that when intended to be kept, the lime water should be in contact with the excess of lime used.

The author was thanked for his very useful note.

In the absence of the author, Mr. Naylor then read the following:—

AMOUNT OF CARBONIC DIOXIDE AVAILABLE IN THE OFFICIAL GRANULAR EFFERVESCENT PREPARATIONS.

By C. S. DYER, A.P.S.

Supplementary to the investigation suggested by the title of this paper is the examination and comparison of certain commercial specimens on the same point with a view to obtaining an official standard.

Of course the quality of a non-medicinal granular saline consists solely in the extent of its effervescence, or, in other words, the object aimed at is to get as large an amount of carbonic acid gas as possible with the least quantity of dissolved salt.

The only practical method of determining the amount of gas was to measure the carbon dioxide volumetrically.

The apparatus used was an ordinary Lunge nitrometer with the urea determination arrangement attached. The nitrometer was filled with water, and to avoid absorption of CO_2 , a little benzene was floated on the surface in the measuring tube; the resulting presence of the mixed benzene and aqueous vapour caused the amount of gas evolved to exceed the theoretical yield by about 10 per cent., so eventually mercury was employed, this giving in every way satisfactory results.

The different samples were moistened with an equal quantity (2 c.c.) of water. This would at same temperature and pressure absorb the same amount of gas, which would not exceed 2 c.c.

Several specimens of commercial sodium bicarbonate were first tried, and were found to give almost identical results, all showing almost exactly the theoretical amount of CO_2 .

Then to ascertain whether the loss of gas on granulating is due to the heating of the bicarbonate, *per se*, the same samples were exposed to a temperature of 100° – 105° C. for ten minutes; that is, under the same conditions so far as heat is concerned as in the process of granulation. The resulting loss in weight amounted to about 2 per cent.; this is apparently water, the same quantity of gas being evolved.

The ingredients of the P.B. sodii citro-tart. effervescens were then carefully weighed out and well mixed.

1. Part of this mixture was immediately tested for quantity of CO_2 .

2. Part was dried below 54°C . without granulating (for comparison with No. 3) to see how much loss the necessary high temperature caused, and

3. The rest was passed through the P.B. process, granulated, and dried.

The two latter parts both lost about 10 per cent. in weight as the P.B. states, but that portion not heated much showed a higher percentage of gas available.

Now, citric acid loses nearly 9 per cent. of its weight in water of crystallization, and the amount present of citric acid is only 16 per cent. The other ingredients only lose about 2 per cent. in weight on treating. How is this 10 per cent. to 12 per cent. loss accounted for? The following paragraph will, I think, make this clear.

Sodium bicarbonate on combining with an acid of course produces CO_2 and H_2O , which is lost on drying. This amounts to 62 per cent. of the weight taken, and as the quantity present is about 46 per cent., the total possible loss in this way would be—

$$\frac{46 \times 62}{100} = 28.5 \text{ per cent.}$$

The observed decrease in weight is about one-third of this, roughly indicating that about 30 per cent. of sodium bicarbonate and acid has combined during the process. To see how far this is actually the case, the following figures will show.

Use mercury in the nitrometer; if using water place a little benzene on surface, and remember the results will be 10 per cent. higher. (See table on next page.)

To summarize the results, it appears that good commercial specimens of the P.B. article and carefully made samples, unless absolutely fresh, exhibit only about 60 to 70 per cent. of their sodium bicarbonate available for effervescing purposes. This, to me, surprising result shows that fully 30 per cent. of the acids and sodium carbonate combines during the process of granulation.

1. Now this 30 per cent. loss of sodium carbonate is nearly sufficient to neutralize the amount of citric acid present.

2. The citric acid causes the mass to flux, because it (the acid) melts at about 100°C .

It is evident, therefore, that at the same time practically the whole of it combines with the carbonate so brought into molecular

Substance experimented on.	Quantity used.	No. of c.c. of CO ₂ evolved at N. T. and P.
1. Sodium bicarbonate . . . {	.15 gramme	41.6 c.c.
2. Ingredients of P.B. eff. citro- tartrate immediately after mixing . . . {	.15 gramme	41.8
3. Ditto dried below 54° C., not granulated . . . {	.3 gramme	39.24 c.c.
4. P.B. process carried through	(46 p.c. Na H CO ₃)	
5. Good commercial sample by well-known maker . . . {	.3 gramme	33 c.c. = 21 p.c. loss gas
6. P.B. eff. sodii sulphas . . . {	.3 gramme	27 c.c. = 32 p.c. loss gas
7. P.B. mag. sulph. eff. . . . {	.3 gramme	26.8 " " "
8. Sample of mag. cit., com- mercial {	.3 gramme	21.8
	(contains only 36 p.c. soda)	15 c.c.
	.3 gramme	15 c.c.

No. 2 shows a slight loss, the powder being very damp.

No. 3 shows nearly as much loss as in the final operations.

No. 4, 32 per cent. loss; this agrees with the loss in weight mentioned before.

No. 6, a comparatively old sample.

No. 7, this preparation contains only 36 per cent. of soda, against 50 per cent. of No. 6; the relative yield is therefore the same.

No. 8 contains about 33 per cent. sodium bicarbonate; result fair.

contact with it, leaving the eventual effervescence entirely to the tartaric acid.

The above method is very useful when desiring to compare many samples of salines at about the same prices as after weighing; only about two minutes is required to complete the operation, so a good many can be tested with a very moderate expenditure of time.

I would throw out the suggestion that the Pharmacopœia ought among the characters and tests of those preparations to state the least amount of CO₂ which each should yield on the above treatment. Any sample which does not show, say, 50 per cent. of its bicarbonate available for producing effervescence should not find its place in modern pharmacy.

Mr. W. MARTINDALE said it was evident from the paper just read that the effervescing properties of these preparations depend on the relative proportions of citric and tartaric acid present; the

citric acid fusing so readily eliminated the carbonic acid and rendered it useless during the process of manufacture.

The PRESIDENT said he had always used the smallest quantity of citric acid necessary to make granules, depending on the tartaric acid for the subsequent effervescing properties. He questioned whether a very active condition of effervescence is necessary, although customers always expected it.

A vote of thanks was accorded to Mr. Dyer for his very practical paper.

The discussion on the New British Pharmacopœia then took place.

DISCUSSION ON THE BRITISH PHARMACOPŒIA, 1898,

For reference to the Papers read, see Pages 435 to 462.

Mr. S. R. ATKINS wished to lead the van of the discussion by saying that of course it must be admitted that any defects that there might be in the new Pharmacopœia must arise from the fact that no Irishman had been engaged on its production. Without saying anything controversial, he wished to say that he did think it was quite time that they as pharmacists demanded respectfully a very different position to that which they had in the production of the Pharmacopœia. It was not enough for them to be brought in simply as experts—and the most important of the experts engaged in its production—but they should ask for a statutory position in its production; that it should not be a position accorded to them as a mere compliment by the body now entrusted legally with its production, but that they should say that, being the body who by their training and their experience were most qualified to furnish the best processes and the best results, they should not simply be invited to co-operate, but that they should ask for something more. Having said this much, he wished to express his difference of opinion from the argument put forward by Mr. MacEwan, who said, in the very valuable paper that he had read, that it would be well if the position of advising on the compilation of the Pharmacopœia were relegated to the British Pharmaceutical Conference. He agreed with him to the extent of thinking that

the work which had been done in the past by the Formulary Committee should be continued by them as leading up to the main thing. Speaking for the moment as a member of the Council of the Pharmaceutical Society, he wished to say that that Society was the body to whom that work ought to be entrusted. The Conference could do a good deal of the guerilla warfare leading up to the campaign; but it was the function and the duty of the Society to be represented. This was no new doctrine of his. In the early days, when he proposed to read a paper on pharmaceutical ethics, so absolutely conservative were they that there was a very solemn conclave of the elders of that day to decide whether the paper contained any dangerous or explosive matter; but they had advanced since those days. One of the advantages of their meeting at those Conferences was that as free-lances they could stand up and say what in another place it would not be expedient to say. Although they had made great progress, he still thought it was their duty to say that they believed that in future Pharmacopœias the pharmacists should have legal recognition.

Mr. J. C. UMNEY said there were two or three points he should like to refer to. Mr. Bird said it was not usual to be able to obtain ext. ipecac. liq. 1 in 1, with 2·25 per cent. total alkaloids, as recognised in the Pharmacopœia; he did not think there was any difficulty in obtaining 16 fl. ozs. from 1 lb. if really good ipecacuanha was used practically free from stems—the root only. That was his experience on comparatively a large scale. With regard to ext. bellad. liq., Mr. Bird had referred to a paper by Mr. Bryant, calling attention to the fact that belladonna was not exhausted by the official process which he confirmed. The Pharmacopœia made no mention of the time of collection of belladonna roots, which had an important bearing in the future on the belladonna preparations made from the root. The time of collection now practically was in the autumn, which probably was the wrong time for getting the best alkaloidal strength. As long as they used green extract perhaps this was unavoidable, as they could not have both; but if they did away with the green extract they would be able to get the root at the proper time. With regard to liq. thyroidei, his observation was that half per cent. phenol solution with glycerin did not keep it satisfactorily, and that they would have to make some alteration in the preservative. He (Mr. Bird) also referred in glowing terms to the abolition of proof spirit. This was all very well from a pharmaceutical point of view, but so long as the chemists and Revenue authorities recognised proof spirit for export

work, and in everything connected with the buying and selling of spirit, it had to be reduced to the standard of proof. They paid duty as proof spirit. If a spirit was 58 over-proof it was exported as 158. For the present, therefore, they would still have to make their calculations at percentage by volume, and also degrees over-proof. With regard to ung. conii going mouldy through leaving out the boric acid, he quite concurred in that. Then Mr. Bird referred to ung. hyd. nit. He (Mr. Umney) had recorded his experience that this ointment did not keep satisfactorily, made with a base heated to the high temperature now prescribed, compared to what it did before. Mr. Bird then referred to the difficulty of making tincture of orange. There might be some difficulty, but it would only happen this year in consequence of the Pharmacopœia being issued in April, two or three months after the latest time when the peel could be got. In future, any prudent pharmacist would look forward and make his year's supply in January. Mr. Gadd stated, in referring to the process for concentrated liquors, that they did not exhaust the drugs. In the case of the percolated liquors that was not the case, provided the percolation were conducted slowly and in accordance with the terms of the Pharmacopœia. It was the case even with rhubarb, which one would suppose to be the worst of all. He also said that the official formula for Easton's syrup was not satisfactory. His observation was that it was one of the most satisfactory in the Pharmacopœia—at any rate, it appeared so after three or four months' experience. He understood Mr. Gadd to say that the strength of the present preparation of tincture of strophanthus was half what it was before, and more than that with a 1 in 20 preparation the drug was not exhausted. That did not accord with his experience. With reference to the statement about lavender oil corresponding to the characteristics of the Pharmacopœia not being obtainable, he had no knowledge of such difficulty. Then Mr. Kelly referred to the necessity for the test for tartaric acid in citric acid. Under certain conditions, and at the time of publication, there was no necessity for the test. Of course their relative value to one another were by no means constant, and even at the present time there was a sufficient difference in price to make it necessary to have a test. With regard to the relative proportion of citric and tartaric acid in effervescing preparations, they were adjusted on a manufacturing scale in accordance with the ingredients to be used, there being a necessity in some cases to add more of the citric acid with its molecule of water

of crystallization, according to the nature of the active substance to be exhibited in granular form. If they were to frame some particular test, such as Mr. Dyer suggested, he did not know what wholesale druggists would do. They had enough effervescent preparations returned to them now after being kept for two or three years on the retail druggist's shelves, and if there were to be some particular test proposed, to which they should be required to correspond, even after being kept he did not know how long, they would be still worse off.

Mr. D. LLOYD HOWARD wished to offer a few remarks from a point of view which had not been touched upon in the papers, viz., that of a manufacturer who was not a pharmacist, but a chemist. He thought the chemical manufacturer ought to be considered in framing a Pharmacopœia, because there were many substances, like Rochelle salt, Epsom salts, quinine and camphor, which few practical pharmacists manufactured themselves. The Pharmacopœia, therefore, ought to be a guide to them as well as to the pharmacist. He, therefore, cordially endorsed Mr. MacEwan's remarks as to the great excellence of the method on which the U. S. Pharmacopœia was compiled. He knew of no other publication which was so concise and clear to the manufacturer, and if the B. P. Committee had taken that as a basis, and given a U. S. Pharmacopœia, the result would have been superior to that now produced. He would only speak of the substances with which he was acquainted. He could not speak of the galenical preparations, which he hoped were all that Mr. Bird claimed for them. That speaker remarked very truly that it was necessary to look both to excellence of product and economy of production. It was very desirable that all products should be of very high quality, but there was a proverb not always borne in mind—that the best is often the enemy of the good, and sometimes he thought they might be tempted by insisting on an unreasonable degree of purity to be led to extravagant expense for which no adequate advantage was obtained. This was especially the case with two articles which were very largely used for domestic purposes as well as pharmacy—citric and tartaric acid. Some years ago there were several prosecutions for selling citric acid containing lead. Undoubtedly some citric acid on the market at that time did contain an amount of lead for which there was no excuse. It was looked into carefully by members of the Drug Club and manufacturers, and it was found that the 1895 B. P. test, if suitably applied, would detect something like one part of lead to a million. Now it was difficult to

visualise one million, but you might reckon it as 1 grain in about $1\frac{1}{4}$ cwt., so that an acid that contained that degree of impurity cannot do very much harm. In the 1898 Pharmacopœia, instead of the acid being dissolved in water and treated with sulphuretted hydrogen, it was directed to be neutralised. That introduced a very serious element of error. It was a very difficult thing to neutralise citric acid or tartaric acid exactly. The public analyst would be very likely, in order to make sure of complete neutralisation, to slightly over-neutralise, and in that case not only was the lead shown by sulphuretted hydrogen in a minute trace, but iron was also shown. It was obvious that in making lemonade, or anything of that sort, in using natural water, however good, there was almost always a trace of iron in it. Now, was it to the public advantage that the manufacturer of aerated water should be compelled to buy citric acid at an enormous expense containing no trace of iron, when he would inevitably put a much greater amount of iron in when he used natural water? With regard to proof spirit, he quite agreed with Mr. Umney that it was a great pity that the number of degrees proof were not officially stated, because it was on the proof strength that one had to buy spirit. He could not agree with Mr. Bird, who approved of the 90 per cent. by volume as against a definite strength by weight, because although it might not be the rule to weigh liquids in this country, it was in many other civilised countries, and in the case of such a liquid as alcohol, which behaved very irregularly when mixed with water, the more scientific plan would be to have it of definite strength by weight. Mr. Doran referred to the removal of the tests to the Appendix, but from a chemical point of view he could not help thinking that taking the tests out of the text was a retrograde step of a disastrous nature. It seemed to be thought if you said a thing must not contain a long string of things, beginning with alumina and ending with zinc, any man of reasonable brains was competent to perform the characteristic tests. Of course he was if it were a question of identifying the substances naturally; but if you had to detect a very minute trace, or if you had to fix a limit to the trace that might be permitted, it was a matter of the highest importance to have the exact details of manipulation given in every case. To take one instance, oxide of zinc should not contain more than a trace of sulphate. How were they to estimate that? The answer would be, by dissolving in acid and adding barium chloride. But which acid? It made a material difference, however carefully you avoided an undue excess of acid, whether you

used nitric acid or hydrochloric acid. There were scores of other instances in the Pharmacopœia. To revert once more to a comparison of the B. P. with the U. S. Pharmacopœia, in the latter you did not find any such indefinite expression as "shall not show more than the slightest characteristic reaction with" so and so, but you found a definite direction given—"take a certain amount, dissolve it, add a certain amount of barium chloride, filter it off, and it ought not to show a precipitate with" another amount of barium chloride. There you had a limit, and the manufacturer who wished to be well up with his work would take care to be within the limit, but when it came to showing a characteristic reaction, who was to say what was a characteristic reaction? He looked at the Appendix, and he found, "this chloride gives a curdy white precipitate with nitrate of silver." He should be ashamed to certify things as free from chloride unless they were a great deal better than that. He should confine himself to the faint blue which was shown when the test was carefully applied. He earnestly hoped that at some future time they might have not merely the tests inserted in the text, but that careful details should be given in each case varying with the necessities of the case, and that in cases where an impurity was innocuous, and likely to occur in manufacture, that a limit—as fine as you liked, but that some limit should be fixed, and that that should be the standard. Because, although the B. P. occupied a somewhat anomalous position, it was the only guide which a bench of magistrates in the country had. They were placed in a very difficult position. Very likely, although they were all fairly well-educated gentlemen, not one of them would have any knowledge of chemistry or physiology. They went by the report of the public analyst, who might be a very good chemist, but was almost certainly not a physiologist, and they fell back on the only authoritative work, the B. P. He could not help thinking that the test for bismuth salicylate was defective. They were working on it now at Stratford, but he had not got the latest results. Some weeks ago they had an inquiry—could they supply bismuth salicylate which would answer the new Pharmacopœia test? They then looked at what they had in stock and found that on shaking up with alcohol at the ordinary temperature it gave a coloration. They looked at one of the other Pharmacopœias, he thought the French, and found it stated there that bismuth salicylate would yield the whole of its salicylic acid on continued boiling with alcohol. It naturally occurred to them that if that were the case

it would be very likely that there was some, if only a slight action, with alcohol at the ordinary temperature of the air. They divided a sample into two parts, and, shaking one part with a considerable amount of alcohol, carefully cooled down to the temperature of melting ice. When he left they had not tried a lower temperature. That quantity of alcohol was quite sufficient to dissolve out very much more free acid than was at all likely to be present in the sample. They also shook up an equal amount of bismuth salicylas with an equal amount of alcohol at the ordinary temperature. The difference in the colour produced was most marked, and that was to a certain extent *prima facie* evidence that the test was defective, because alcohol had some action at the ordinary temperature of the air on bismuth salicylate.

Mr. WARDLEWORTH thought there was one point which arose out of Mr. Howard's remarks which was very pertinent—that with the increase of the percentage of bitartrate of potassium in cream of tartar there was an alteration in the synonym. He had looked back to two or three Pharmacopœias, and in the last the synonym was “cream of tartar,” but in the 1898 edition it had been altered to “purified cream of tartar.” Now the question to his mind was this, What was the position of the chemist who was asked for cream of tartar, say for domestic purposes such as had been indicated by Mr. Howard, or when asked for cream of tartar for pharmaceutical purposes? It seemed to him a distinct issue was brought about there, for the simple reason that cream of tartar was largely imported with the percentage of bitartrate of potassium varying from 90 up to 98 per cent. If the B. P. was accepted as the standard, what was the position of the man who sold cream of tartar that was not purified? Was the customer to ask for “purified cream of tartar” when he wanted 97½ per cent. bitartrate of potassium, or was the retail chemist to run the risk of selling 92½ per cent., which was a very common percentage, and be caught by the public analyst for selling cream of tartar which was deficient in bitartrate of potassium?

Mr. WELLS rose as an Irishman to ventilate one more Irish grievance, which he could assure the Conference was a real one. He alluded to their not having any part as pharmacists in the compilation of the Pharmacopœia. In 1883 they were asked to assist in an informal way with suggestions for the Pharmacopœia then being prepared, but declined on principle, as they thought they ought, as pharmacists, to have a right to take part in it. In 1890 they were again requested to assist, and did send some

suggestions, but they were rather busy with a parliamentary campaign, and had very little time to give to it. Of course they had to go by the B. P., but they thought there was too much of the London Pharmacopœia about it. Take *mist. ferri aromat.*, that was a preparation which was very largely used in Dublin, and he knew one retail house where they prepared as much as fifty gallons at a time; that was left out altogether, but they left in *mist. ferri co.*, a preparation seldom ordered in that city; *dec. chinchonæ* was also largely prescribed in Dublin, but there is now no official standard for these and other old and much-used preparations. If they in Ireland had had some little part in the drafting of the book, it was probable that each place would have left in the things which were most in use, whilst a great many things might be left out which were perfectly useless. There was another point of general interest to pharmacists all over the kingdom which he feared would cause some trouble, viz., the change in the strengths. Most chemists in Dublin, when the Pharmacopœia became official, began at once to use it, but with regard to tincture of *nux vomica* and some other potent medicines, they did not know what was intended in the prescriptions of the present time. This was very important. The compilers ought to bear in mind that these unnecessary changes caused an immense amount of trouble. There might be some good reasons for them, but he had not heard of them. He had had four Pharmacopœias and a few Addenda pass through his hands, and he must say he got rather mixed up between them. It was all very well to improve the Pharmacopœia, but unnecessary changes should not be introduced. The only way to arrive at that would be to put it into the hands of the pharmacists, and then they would have a book which the British nation might be proud of.

Mr. T. MALTBY CLAGUE concurred in the view that pharmacists ought to have a statutory right to the making of the Pharmacopœia, or, at all events, a large share in it. He was surprised to hear on Irish soil, Mr. Atkins, who was always noted for the graceful way in which he did things, say that the Pharmaceutical Society, which only ruled in the Sister Isle, should be the body to whom this work should be entrusted. He thought the Conference was *par excellence* the body which should have the duty, because it represented Great Britain and Ireland, and so the catastrophe of having a Pharmacopœia compiled without the aid of Irishmen would be avoided. Mr. Atkins began on right lines, but he got sadly astray. He was glad to hear it come as a confession that day

that this last Pharmacopœia was a wholesalers' Pharmacopœia. He maintained that the retailers ought to have a great deal more to do with any future Pharmacopœia, and he thought they intended to. The wholesale people had had a little too much their own way this time, but the retailer ought to be represented, because he paid for it more than any one else. Not one doctor in twenty was in possession of a copy of the 1898 Pharmacopœia; the wholesale druggist absorbed a fair number, but the great bulk of the purchasers came from the men behind the counter. They had a right to criticise the wholesalers' treatment on the subject. They were glad of the generous way in which they set to work, carried out researches, gave samples and read proofs, but he noted in one or two particulars they had not been quite so generous as a retail pharmacist would have been. Where was the generous wholesale house to be found which said, when it came to a question of concentrated liquors, they are all quite easy except gentian, we have a good formula for gentian, here it is? but they did not rise to that magnanimity. There were hundreds of retail pharmacists who would gladly have given them a good formula, and one that would keep. There was another point which the wholesalers would have to explain away, either there or when they got into the witness-box, viz., why they put glycerin into tincture of rhubarb. He thought it was so that no one could make a reliable analysis of it.

Mr. FARR said he should like to endorse Mr. Bird's remarks that repercolation could be with advantage extended to a number of other preparations. Judging by his own experience, it might have been adapted to a number of drugs where it is not now official. There was no doubt whatever that the use of heat as now official was deleterious in the case of many preparations. Mr. Gadd spoke of the non-exhaustion of belladonna root in making the liquid extract, and, working with very small quantities, no doubt that would be the case, but with any reasonable quantity a fair degree of exhaustion was obtained. Further, it was questionable how far it was desirable to carry exhaustion in the case of some of these drugs. Taking into consideration the cost of the drug, the process could not be profitably extended beyond a certain degree. It either meant an undue waste of spirit or else the application of heat in recovering spirit that was not rewarded by any extra quantity of active matter. As a rule, the active portion of drugs came away in the earlier fraction, which had a less relative proportion of extractive. Mr. Gadd also spoke of the assay for strychnine in the nux vomica preparations, and seemed to be in favour of the

reprecipitation process, but personally he could not endorse that view, though he had used it on a number of occasions. There was no doubt whatever that it contained a small proportion of brucine, which was precipitated with the ferrocyanide of strychnine, but that proportion was very slight, and the extra trouble in the assay was not compensated for, as the actual amount of impurity remaining was almost infinitesimal. The reaction for brucine was very delicate, and also the bitterness could be easily detected. Mr. Bird said, with reference to the concentrated calumba preparation, that the liquid should be 18 ozs. instead of 16 ozs., but he did not think that was permissible, because it would alter the proportion of spirit present in the resultant product. If a definite volume was required it should be made up by adding a mixture of spirit and water on to the filter. He also suggested that the present tincture of strophanthus, although only made from half the proportion of drug, was considerably more than half the strength, but he did not think he had any warrant for making that statement. Some two or three years ago Mr. Wright and himself examined into this question, working on the strophanthus which had been extracted with ether, and also on that which had not been so extracted. They made preparations for the whole series of different strengths of spirit, and afterwards found that the amount of extractive present in these preparations which was soluble both in absolute alcohol and distilled water, *i.e.*, the amount of extractive less the mucilaginous, resinous, and oily matters present in the seeds which would correspond very fairly with Fraser's impure strophanthin, was practically the same, whether the menstruum used were 40 per cent. or 90 per cent., or where the seeds had previously been extracted by means of ether.

Mr. RUTHERFORD HILL said there was one point in Mr. Kelly's paper which he thought deserved notice. He referred to many changes which had taken place in the Pharmacopœia, and particularly to the change in the atomic weights of the elements. Mr. Bird paid a compliment to the Pharmacopœia Committee that in the book now produced they had something thoroughly up to date. He supposed it must be accepted that this change in the atomic weights was with the view of being up to date, but at the same time he did not think there was any justification whatever for these changes. It seemed to him it was almost reducing the question to an absurdity to introduce these atomic weights in the case, for instance, of the volumetric solutions. Take for example sodium hydrate, the equivalent for which was now given as 39.76

in place of 40. Admittedly in volumetric estimations the results were only approximate, and it seemed absurd in arriving at approximate results to trouble with such minute differences. Mr. Kelly remarked that of course they could not change the atomic weight of hydrogen "which remained 1, of course," he said. That was a very common remark, but it seemed to him entirely beside the point. It was not the case at all. Taking hydrogen as unity was perfectly arbitrary, and it seemed to him the mistake that had been made had been in taking hydrogen as unity instead of taking oxygen as 16. It did not matter where you began; if you took oxygen as 16, and made that the central point, you could arrange all the other weights around oxygen, and in that case the hydrogen would come out about 1.007. For most purposes they would not take it as 1.007, but as 1; but if you did wish to be particularly exact in some original research, you might take the 1.007. If, instead of taking hydrogen as unity, you began with oxygen as 16, and worked out every single one of the volumetric solutions, and the operations involved in using them, you had round numbers in an immensely greater number of instances than you had when you took hydrogen as unity and oxygen as 15.88. He thought the modern tendency to begin with hydrogen as unity, and give all these minute fractions for the other elements, was an entirely erroneous one, and that it would be much better, and make the working out of all these calculations much simpler, to take oxygen as 16, and range the other elements around it. He had tried it in many instances, and found in the majority of cases it worked out at practically round numbers for all the calculations.

Mr. COWLEY said, with regard to the extraction of belladonna root, working with small quantities he had been able to obtain nearly $1\frac{3}{4}$ times the volume that the Pharmacopœia ordered in the first percolate, and even then it required slightly letting down. With regard to syrup of rhubarb, he was at a loss to understand the reason why the coriander was put in to commence with, because in the evaporation almost all trace of the oil of coriander was lost. It would appear to be much better if the oil were put in at the last, or to take, for instance, a small part of the distillate, and add it to the product. He agreed with Mr. Hill with regard to the atomic weights, and he believed a great number of chemists were adopting the plan he suggested, for it certainly made it much easier to make most of the calculations with which pharmacists had to do.

Mr. MARTINDALE said he must, as one who had assisted the

Pharmaceutical Society's Committee in the production of the Pharmacopœia, acknowledge that the book had been fairly criticised, and he was glad that it had come out as well as it had. At the same time he was sorry Dr. Attfield was not present, as they hoped he would be. At the outset he must disclaim holding any brief in favour of the Medical Council. He stood there simply as a member of the Council of the Pharmaceutical Society, and to express his individual opinions. He might say that, whatever claims might be made by pharmacists to be entitled to produce the Pharmacopœia, they had no legal foundation for the claim. The Medical Act of 1858 clearly gave the Medical Council the right to produce the British Pharmacopœia, which should displace the Pharmacopœias of London, Edinburgh, and Dublin, and that had been so far done by the introduction of the Pharmacopœias of 1864, 1867, 1885, and now of 1898. The Pharmaceutical Society Committee gave advice and assistance as far as possible as experts, but they had no voting power with regard to the preparations to be contained in the book. They sat in committee and gave the best attention to the subject, and their reports went to the Medical Council, and more especially to the committee appointed by that Council to deal with the matter. He could not say the position was always agreeable—sometimes there was a little clashing, but at the same time he thought they were in a better position, and that pharmacists and the public were in a better position with regard to it than the pharmacists of the United States were with regard to their Pharmacopœia. As Mr. MacEwan had said, the United States Pharmacopœia was really a private speculation. It was undertaken by a committee of revision which produced the first United States Pharmacopœia. It had gone through eleven or twelve revisions, a new edition being produced every ten years, but it was entirely in the hands of a self-elected Committee, just as the Unofficial Formulary was produced by the Conference. In fact, the U. S. Pharmacopœia was more of a private speculation than the Unofficial Formulary, because there was no legal status for the Pharmacopœia of the United States, though it was a legal authority. He granted they took every care possible, and it was a work well worthy of imitation in many respects, but in others he should say the British Pharmacopœia was better. The U.S.P. contained much matter which was irrelevant to a Pharmacopœia. With regard to the British Pharmacopœia, a good many of the chemical tests had been transferred from the text to the Appendix, which he thought was an advantage, though he did not wish to dwell upon

that point, and would pass on to some of the criticisms which had been made. First of all, liq. ext. cascara, which had been noticed by Mr. Bird; it was Mr. Moss's formula slightly modified. It was believed by a good many to be a good preparation, although he differed from that, and had expressed himself so on many occasions. He thought a drug which depended a good deal for its activity on its resinous matter should have a better solvent than distilled water as a vehicle for exhausting it; he should have preferred 20 per cent. of alcohol. It had been complained that in making liq. ext. bellad. the root was not fully exhausted. He did not know that it was necessary that any drug, vegetable especially, should be fully exhausted. What was the use of so doing, when the game was not worth the candle? If you had very little left in the marc it was better to throw it away, and save time, labour, and spirit.

Mr. NAYLOR suggested that it was said there was a loss of 20 per cent. total alkaloids.

Mr. J. C. UMNEY added that his experience, working with percolators each containing 100, was equally unfavourable.

Mr. MARTINDALE said he had not any facts before him to show there was such a loss, though he was open to be corrected. From the Pharmacopœia process now given, he got the preparation yielding the amount required by volumetric test, and, therefore, he was satisfied with it. He might have got more, but he hardly thought it was worth the trouble, especially as belladonna root was not very expensive. If it did not cost more than 6d. per pound, the labour used in exhausting it was worth more than the root. Coming to the solid extract of belladonna, his experiment produced a sort of moist powder. Mr. Bird's two preparations were shown, one was a very firm extract, but hardly a powder, and the other was somewhat soft. He thought the preparation in most cases would be a coarse, moist powder, rather than a solid extract. With regard to ergotine, now called *extractum ergotæ*, he thought this was a very great improvement on the last Pharmacopœia. It was a preparation somewhat similar to that in the Swiss Pharmacopœia, with an improvement suggested by himself and others who had worked at it. They found the Swiss preparation, originated by a Swiss professor, made a much better preparation than that in general use. The ergot was extracted by 60 per cent. alcohol, this was added to water which precipitated the resinous matter. The clear liquor, when concentrated, was acidulated with hydrochloric acid, which threw out the scleretherin; on neutralising with soda and evaporating you got a preparation perfectly

soluble in water when finished. The albuminous and mucilaginous matter in the preparation was not taken up if you used 60 per cent. alcohol at first to exhaust the ergot. About alcohol there had been a good many disputes, and, in fact, a terrible struggle in the Committees. The modification to produce the percentages now introduced, which he thought very much better than the old proof and rectified spirit, which really had no scientific standard at all, was certainly an improvement. Mr. Bird observed liquids were weighed for the formation of ointments, and looking to the probability of contaminating measures, although he was in favour of measuring liquid for most purposes, in this case they were more accurately and satisfactorily weighed. Mr. Bird complained of there being no formula for Parrish's syrup, or the compound syrup of hypophosphites, but he did not think it was dignified to try and imitate every nostrum that got into use. It was degrading to pharmacy, and he was very glad they were not put in the Pharmacopœia. If they attempted to put in such preparations as the compound syrup of hypophosphites, look what it meant to introduce quinine, hypophosphites of manganese and iron, etc., and they would have to fill up the book by monographs on half a dozen preparations to insert imitations of these nostrums, which was certainly not worth doing. Syrup of iodide of iron was now very much improved; it was now virtually 10 per cent. It made the preparation a little stronger than the last, and was improved in another way by a test which really would be a check on the wholesale manufacturer, if the retailer did not choose to manufacture this himself. There was great competition nowadays with regard to supplying hospitals and others, and if it were sent in at 6*d.* or 1*s.* a lb., they could see whether it could be done at the price, and if the quantity of iodine was present. Passing to syrup of rhubarb, he was not a wholesale druggist, and wanted his preparation good, and in regard to this syrup he thought that was as good a preparation as could well be introduced. It was exhausted by means of weak alcohol, which exhausted the coriander as well. Percolated in that way you exhausted a drug as well as could be, and with syrup it was made palatable and efficacious. With regard to the loss of oil of coriander it was a very minute trace, it still retained a good deal of the flavour, which was sufficient to disguise the rhubarb. In the case of syrup of senna it was thought almost that it might be made by using the concentrated infusion as a basis, or the concentrated liquor that was made by re-percolation. This concentrated liquor would have to stand the test of time, and he rather questioned whether it

would stand it. He knew it would not with, perhaps, 30 per cent. of the senna in the market; it would be decomposed before it was finished making, unless you used chloroform water rather than plain distilled water as a menstruum. It was suggested they should use that as the liquor to convert into syrup by merely adding sugar, but that was at last discarded, and the syrup of senna made by repeated pressing, as our President once suggested, he thought, at Aberdeen, was adopted. If you added the smallest quantity of liquor necessary to moisten the senna, pressed it out, and then put on the second quantity, setting aside the first, and even setting aside the second, and then at last added a little greater excess of menstruum, you got a third liquid which could be concentrated down to a small volume, and the heat necessary to concentrate that preparation down to a small bulk was expended on the weakest part of the liquid obtained. If that were added to the previous liquors set aside you got a preparation of senna that had not been injured by the prolonged action of heat. A curious point then presented itself; it required Pasteurising, because it did not keep well unless heated up to 190° , or else when the sugar was added it decomposed. It differed from making syrup of senna or extract of senna with water in this sense, that if you employed water you took out a lot more than you needed; you took out a lot of mucilaginous and useless matter which you did not want. If you used 20 per cent. alcohol you only took what was the medicinal matter, rejected the mucilaginous matter, which was inert, and was better not exhausted. Therefore, he held you got a good syrup of senna, although it had been criticised as not being suitable for Ireland, where it was to be contracted for for unions. He held they ought to make preparations good, and if the pharmacists in Ireland, either Dublin or Belfast, could not make their prices meet the preparations, he was sorry for them. If they supplied a good preparation they would get credit for it. Passing on to tincture of rhubarb, he could not defend that altogether; he did not know why glycerin was added to the tincture after the rhubarb was exhausted by alcohol. He had nothing to do with it.

Mr. UMNEY said that suggestion appeared in the *Year-Book*, but he could not at the moment recall the name of the worker.

Mr. MARTINDALE said, as a pharmacist, he doubted the efficacy of that preparation. Then, coming to the nitrate of mercury ointment, that process came from the formula of a celebrated house, and would make a good preparation if it were carefully done, but it required great experience to make it well. You could

get the same results if you used the two solutions of nitrate of mercury and of lard and oil, both at 190° F., before mixing. In the present formula they had the oil and lard at about 300° F., and the mercury solution as cold as possible. He had made the preparation, and it would make a good preparation, notwithstanding what had been said. He had made it exactly by the Pharmacopœia, taking the quantities named. With regard to liquid extract of *nux vomica*, the testing of that was only for the amount of strychnine it contained. There came to the knowledge of the Committee the pretty well authenticated fact that *brucia* is almost inert, and to volumetrically estimate the amount of combined alkaloids in the preparation which would give probably half strychnine and half *brucia*, this without verifying the amount of strychnine present, might give a preparation of very uncertain strength and doubtful utility, so that now it was to be tested for the amount of strychnine only. Compound extract of *colocynth* was a wholesale preparation. He did not like the preparation in the B.P., and should have much preferred to exhaust the *colocynth* by means of alcohol and evaporate that down to dryness, and added this to the other powdered drugs present. Why should they continue the evaporation with all the drugs which were dried merely to make a preparation which in powder had a nicer appearance? When this was suggested to be continued he said that his drugs were made to act and not to look at. The extract of *strophanthus* was exhausted by means of ether and alcohol and evaporated down to such a condition that it had to be diluted in a certain amount of sugar of milk. When you got the result it was a white powder; it was hardly in the nature of an extract. Extract of Calabar beans was a pasty extract, not a hard, stiff paste. He agreed with Mr. Umney and another speaker with regard to Easton's syrup; that of the Pharmacopœia had stood the test of keeping better than various others which had been prepared under his own supervision, not exactly according to the formula. The formula in the Pharmacopœia was to use sulphate of quinine rather than phosphate; it was suggested that the precipitated preparation of quinine should be used dissolved with phosphoric acid; you washed the quinine away by such a method. The small quantity of sulphuric acid which would be left in the preparation was not worth notice. He had proved that it would keep well for twelve months if carefully prepared without being much coloured. The alteration in the strength of the tinctures was not a pharmacist's alteration; it was introduced by the medical authorities. They wanted the

doses of the tinctures to be 5 to 15 minims if active, or if weak half a drachm to 1 drachm. The alteration in the tinctures of aconite, nux vomica, and strophanthus was made to please the medical authorities. He held that it was a mistake, as it meant administering a larger quantity of alcohol than was necessary, and it was retrograding to alter their doses merely to please medical students. It would have been much better to have made them of decimal strengths, 1 in 5 and 1 in 10—1 in 5 if possible, but if not 1 in 10—then if the student knew the dose of a drug, he would know the dose of the preparation. It would be 5 times, and in some cases 10 times, the quantity of the crude drug itself. He thought to make preparations of the present variable strengths was a mistake. Ung. staphisagriae, Mr. Gadd said, would be much better made with the oil, but he did not think the oil contained all the properties of the drug, and that the maceration of the stavesacre seed in the melted fat gave a better preparation than if it were made from the oil. Unfortunately they left out the boracic acid from the ung. conii, with the result, as two of the speakers had corroborated, that it became fungoid. However, in this case it was not their choice, but that of the Medical Council; they merely advised the formula. With regard to salicylate of bismuth, he agreed with Mr. Kelly and Mr. Howard that no salicylate of bismuth would stand the test of the B.P. You could wash out from even basic salicylate of bismuth salicylic acid by treatment with cold alcohol. You would get no preparation up to a present standard. He had not much sympathy with Mr. Howard as a chemical manufacturer in other respects. He held that they must keep manufacturers up to the mark. They wanted to produce a good article, and it was the business of the chemist to see that they did it. Then with regard to the U.S. Pharmacopœia limit of adulteration, he did not believe in limits of adulteration. Suppose they applied the same to milk. If they had a limit the milkman would adulterate up to the standard. It was a great mistake to set limits; it was very much better to have it indefinite and to get the manufacturers to produce as good an article as they could, and keep them up to a very high standard if necessary. With regard to Mr. Druce's remarks, he wished Mr. Holmes had been present to deal with them, but he agreed with Mr. Druce that the botanical part of the work had been thoroughly well revised, and had been brought up to date as well as any part of the book. With regard to Mr. Wells' remarks on mist. ferri aromat., it was not thrown out by pharmacists, but by the Medical Council themselves. The same remark

applied to compound tincture of cinchona. The changes in strength were made entirely on the responsibility of the medical authorities. With regard to purified cream of tartar, he held that unless they sold it as purified it need not be up to the standard. Ordinarily, cream of tartar could not be up to the standard of the Pharmacopœia if it be natural cream of tartar. He was pleased to see that the Pharmacopœia had been accepted so well as it had. He thought it was a great advance on the last one, and when it got into full working order it would turn out very satisfactory. There were not above a dozen preparations which need to interfere greatly with the doses. Medical men need be under no alarm that they were getting a weaker or stronger preparation than the last, if they would only learn the details of about ten preparations.

The PRESIDENT said they had had an extremely interesting discussion on the Pharmacopœia, and he should like to have said a good deal about it himself had time allowed. He should be sorry if there were the least idea that any of the remarks made there with reference to the B.P. were regarded as showing that pharmacists were in any way antagonistic to the medical profession. Several years ago, when the Society attempted to obtain recognition of pharmacists on the Pharmacopœia Committee, and sent out a form of petition for the purpose, to be signed by medical men, he, as the Local Secretary of Liverpool at that time, took it round to all the leading medical men in Liverpool, and did not get one refusal. Every medical man signed it, and he was very much complimented on the effort that was being made. It was, therefore, not a question of antagonism to the medical profession. Those who had been accustomed to take the volume and read the words "by authority" on the cover would be a little shocked when they heard Mr. MacEwan put the question, "Why should British pharmacists trouble about the Pharmacopœia?" He, however, went on to explain his reasons, and he (Dr. Symes) might confirm his statement, because he had read the short Act of Parliament which authorised the Medical Council to prepare a Pharmacopœia, and there was not one word in that Act which prevented them from appointing a committee partly of pharmacists. He was afraid it was rather an unorthodox view, but he believed that if they had stood up for their position, and refused to act at all unless they had a proper status, they would before now have had the position they desired. It might be interesting to those Irish gentlemen who felt hurt that they were not properly represented to say that when three Phar-

macopœias existed, one for Dublin, one for London, and one for Edinburgh, the Dublin Pharmacopœia was the only one which had the authority of an Act of Parliament. The London one was authoritative by an Order in Council; but that of Edinburgh had no authority whatever. Such was the statement in the preamble to the Act he had referred to. Referring to the present work, he might say that there were difficulties in the way of reducing all kinds of tinctures to two uniform series of doses; if he were a medical man it would certainly puzzle him far more to remember whether such and such a tincture belonged to this class or that than to remember the actual dose. It seemed absurd that in drugs of all sorts of potentialities there should be an attempt to reduce those to two particular standard doses, whilst at the same time recognising the fact that those drugs must be dealt with differently in the process of preparation and could not all be exhausted by any particular strength of spirit, so that they had wisely introduced four strengths of alcohol for exhausting various drugs. If they recognised the diversity with regard to the alcoholic extraction why try to reduce them to two levels in the matter of dose? As a matter of percentage certainly it would be very convenient if they had definite substances to deal with; to have, say, 5 and 10 per cent. solutions, and so on. Whilst they had altered some preparations with this object in view, hydrocyanic acid, one of the most potent drugs in the Pharmacopœia, which would have borne making 1 per cent., had been left at 2 per cent. He thought it would have been a great advantage to have had hydrocyanic acid in a 1 per cent. solution, it would have been a very definite thing, affording greater accuracy in dispensing, and probably possessing better keeping qualities. If they were to have these alterations they should be at least consistent. He did not know whether time would allow of all the gentlemen who had read papers making replies, but if there were any vital point on which any remarks had to be made he should like to hear them.

Mr. BIRD said he should like to remove one or two little misapprehensions which appeared to have occurred from some of the statements he had heard. With regard to tincture of orange, he did not mention anything about a difficulty in making it. He simply alluded to the alleged objection to the use of fresh orange peel; but with regard to what Mr. Howard said respecting the strength of the alcohol in the Pharmacopœia he found no fault with that whatever, and did not suggest that the strength should be expressed by weight. If you had to make a dilute alcohol in

summer or in winter, it was certainly better to weigh the spirit than to mix by volume. In the first place you had to bring both liquids to 15.5° C., then mix them, and then cool them down again to the required temperature before final adjustment. With regard to Mr. Wells' observations, the change of strength in the tinctures had affected Englishmen quite as much as Irishmen. The imitation of proprietaries referred to by Mr. Martindale had a precedent in the Pharmacopœia, and there really was a great disappointment that those two syrups, the chemical food and the hypophosphites, were not included. The new Pharmacopœia was essentially a physicians' Pharmacopœia, and perhaps their convenience had been primarily studied, but he did not think pharmacists had lost by the new formulæ. A man bought, say, 1 lb. of liquid extract of belladonna. He had several preparations which could be made extemporaneously, and was able to make those preparations with a minimum of trouble and with an advantage formerly afforded only by non-official liquors. It was a great pleasure to him that this discussion had come before the Conference, because it really reflected so many interests, the interests of pharmacists both of Great Britain and Ireland, and also on account of the very wide and desirable publicity given by the reports of what took place at those meetings.

Mr. MACEWAN asked if the Executive Committee in the course of the next year would definitely consider the proposals which had been made with regard to the recognition of pharmacists in compiling the Pharmacopœia. Several members had asked him if no definite resolution would be put, but he thought if the Committee took it up as a point of honour in association with the Formulary Committee, and made some inquiries, and put something definite before them next year, they would come to a conclusion once for all. This was the only Imperial British pharmaceutical body, the only body which could properly act, and for that reason the British Pharmaceutical Conference Executive ought to put into itself a little backbone, and give them something definite to guide them in the future.

The PRESIDENT said he felt sure that the authors of these Pharmacopœia papers would have replied more fully to the interesting criticisms had time permitted.

A very hearty vote of thanks was then accorded to the authors of papers, and to those who took part in the discussion on the Pharmacopœia.

The vote was unanimously agreed to.

This brought the reading and discussion of the papers to a close. The two latter replies are reprinted from the trade journals.

REPLY FROM MR. F. C. J. BIRD.

SIR,—The discussion on the new Pharmacopœia, having extended far beyond the hour fixed for the concluding business of the Conference, was prematurely closed by the President. As there was no opportunity at the meeting for a detailed reply, Dr. Symes has desired me to deal, through the pharmaceutical press, with the points on galenical pharmacy raised by the various speakers. Mr. J. C. Umney alluded to the bad keeping qualities of liquor thyroidei. According to the Pharmacopœia, it should be “freshly prepared,” but further on in the same sentence we are told that it is to be “kept” in well-stoppered, sterilised bottles. So that the efficacy or otherwise of the preservative depends on the construction placed upon the expression “freshly prepared.” A well-known authority on these animal extracts told me that liq. thyroidei prepared with chloroform water (B.P., 1885) in place of phenol solution will keep good for quite six months—certainly the official liquor does not remain “free from any odour of putrescence for this period.” Mr. Umney regretted the abolition of proof spirit on the ground that this standard is recognised by chemists and the Inland Revenue for export work. Whilst agreeing with him that for this purpose the proof standard is useful, I still strongly maintain that from the standpoint of the pharmaceutical laboratory the system of the Pharmacopœia is the more advantageous in every way. The Pharmacopœia is a guide for the preparation of medicines, and naturally does not study the convenience of those who export tinctures, etc., in bond. After all, the inconvenience to the latter is more apparent than real, for the many published spirit tables show the relation between proof strength and percentage volume at a glance. With reference to tincture of orange, what I wished to point out was that for the reason mentioned by Mr. Umney the objections raised against the use of fresh peel have little weight. I think it would be inconsistent to officially state the equivalent of 90 per cent. alcohol in proof degrees as desired by Mr. Howard. 58° o.p. is well known commercially as the approximate strength, and having obtained the standard alcohol, all other operations can be conducted according to the Pharmacopœia system. Mr. Howard preferred to express the strength of the standard alcohol by weight instead of by volume. The official plan appears the more suitable

for pharmaceutical purposes, 90 per cent. by weight being much stronger than and consequently too far removed from the rectified spirit of the 1885 Pharmacopœia. On the other hand, in order to take advantage of simple relations in strength, the diluted alcohols would have been mixed by weight, a method which, where alcohol is concerned, is quicker and more accurate than measurement. Mr. Wells spoke of the inconvenience caused by changes in the strength of potent preparations like *tr. nucis vom.* This has been felt by everyone, and only emphasises the fact that the convenience of physicians has been the chief consideration with the compilers, and that as far as possible their object has been to simplify matters for the medical practitioner. Mr. Clague concurred in the view that the Pharmacopœia is a wholesalers' Pharmacopœia, and that retailers' have not had sufficient to do with its compilation. A glance, however, at the list of names constituting the Pharmacopœia Committee shows that the retail element far outweighs the wholesale on that committee. I cannot admit that the wholesale pharmacist is favoured more than his retail *confrère* by the new Pharmacopœia. The latter now makes his tinctures, etc., as easily as before, in some instances even more easily. The standardised liquid extracts, perhaps, are more difficult for him, but these serve as liquors for the extemporaneous production of the tinctures, etc., into which they enter, and thus render the economy claimed for such preparations officially possible. Mr. Clague also reproaches the wholesale houses for their want of magnanimity in not coming forward with a good formula for *liq. gent. co. conc.* This was one of those infusions experimented with by the compilers (under the advice, presumably, of the Pharmacopœia Committee), which underwent deterioration on keeping, or were wanting in flavour or aroma, and as wholesalers knew nothing of the contents of the Pharmacopœia until several copies of the work had been printed, it is not easy to see how they could have come forward with a good formula for the liquor in question. The presence of glycerin in tincture of rhubarb, which Mr. Clague wished wholesalers to explain away, can hardly be placed to their credit, for its use was recommended in 1893 by W. Warrington in the *Western Druggist* "to prevent precipitation and render the tincture more permanent." A reference to this, as mentioned by Mr. J. C. Umney, may be found in the *Year-Book* for 1893, p. 196. Mr. Farr did not follow my meaning with regard to *liq. calumbæ conc.* The suggestion was to use sufficient water at the second maceration to yield a definite quantity of product. The quantity of water would, of

course, depend on the amount of liquid obtained at the first pressing. As the formula stands, it is possible for the product to vary both in proportion of alcohol and extractive. Mr. Martindale was of opinion that the ext. casc. sag. liq. is not so good as the 1885 preparation, on account of the absence of spirit in the menstruum and consequent imperfect solution of the resinous constituents of the bark. Although at first sight this is apparently a defect in the formula, experience shows that the concentrated aqueous solution of certain principles of the bark forms a very good solvent for the resinous portion, the latter precipitating on the addition of much water. Certain it is that after treatment with water, as in the B.P. process, neither boiling water nor proof spirit removes any appreciable amount of extractive from the marc. Ext. belladon. alch. generally occurs as a pale granular non-coherent mass, bearing little resemblance to an extract, and I did not intend to convey the impression that it possesses any of the physical properties of an ordinary extract. The ground on which Mr. Martindale defends the omission of the phosphate and hypophosphite syrups appears hardly tenable when the inclusion of liquor picis carb. and liq. pancreatis is called to mind, for precisely the same argument as to the undignified practice of imitating nostrums is applicable in those cases also. Might not the second difficulty which he mentions have been overcome by inserting very short characters and tests for the manganese, quinine, and other hypophosphites, etc., required in the formula? I am pleased that this important subject has been discussed at a meeting of the British Pharmaceutical Conference, a body which represents such varied interests of pharmacists, not only in Great Britain and Ireland, but throughout the British Empire, and the publication of whose proceedings affords such wide and desirable publicity to all matters considered at its sessions.

REPLY FROM MR. H. WIPPELL GADD.

SIR,—In common, I think, with many others, I was disappointed at the premature collapse of the Pharmacopœia discussion at Belfast. With your permission I will, therefore, take this opportunity of replying to some of the criticisms on my paper.

With regard to the separation of strychnine and brucine in the estimation process for nux vomica, I think my point was hardly understood. No amount of washing appears to free the precipitate *absolutely* from brucine, whilst the bitter taste persists in the filtrate. Prolonged washing, moreover, causes a considerable

diminution in weight, with a probable loss of strychnine. Results therefore, will differ in accordance with each analyst's idea as to the proper quantity of acidulated water to be used for washing the precipitate. Mr. Farr condemns the reprecipitation process, but will he tell us how we are to know when the strychnine precipitate is sufficiently free from brucine for all practical purposes?

Ext. physostigmatis.—In the absence of any definite standard of weight for the finished product in the process for this preparation, there will undoubtedly be variance in the potency of samples from different sources.

Concentrated liquors.—Mr. Umney says that the B.P. process does exhaust the drugs. It may in some cases, but I have before me now a sample of liq. chiratae conc. made strictly in accordance with the Pharmacopœia, and the residual marc is certainly not exhausted.

Syr. ferri phosphatis cum quinina et strychnina.—I have so far found the B.P. process unsatisfactory, as have others. Mr. Martindale's objection to the precipitation process is, however, worthy of consideration.

Tincture of strophanthus.—On the strength of a journalistic note I made the tentative suggestion that this tincture did not differ so widely in potency from the 1890 preparation as would appear from the formula. Mr. Farr says that there is practically no difference in the exhaustion of the drug, whether a strong or weak alcoholic menstruum be used, and as I have no experimental data to compare with his, I accept his conclusions.

Ol. lavand. exot.—I hear from a distiller that "he doubts if it is at all possible to obtain an oil of the B.P. density, seeing that the average does not exceed .875."

Ung. hydrarg. nit.—The B.P. process may not be a perfect one, but I have obtained good results by its use. Two points are of importance—the quality of the olive oil used, and the preparation of the mercury solution in an *open* vessel, so that the fumes may be rapidly carried away.

Ung. staphisagriae.—It may be remembered that Mr. Balmanno Squire some little time ago stated, as the result of experiments, that the activity of stavesacre was entirely due to the oil; and, if that be so, it would be well if the present wasteful and troublesome process were modified, as suggested in my paper.

I wish to thank the members of the Conference for their kind reception of a hastily-prepared paper, and you, Sir, for allowing me to reply in your journal.

The last contribution, owing to the lateness of the hour, was taken as read; due thanks, however, was accorded to the author.

It was entitled :—

ALBUMINS AND SOME TYPES OF PROTEID DIGESTION.

BY GORDON SHARP, M.D. (EDIN.).

The following fragment is the result of some work done four years ago. It was my intention at that time to carry out a somewhat more ambitious scheme, which, however, pressure of other duties has prevented me from even attempting. The incomplete character of my experiments renders this explanation necessary.

Probable Constitution of the Albumins

Although nothing definite is known regarding the constitution of the proteid matter called albumin, it is believed to be in reality an albuminate; that is, the proteid matter of albumin is looked upon as playing the part of an acid, the base being either sodium, potassium, or calcium and ammonium. This point, it must be admitted, has not been accurately determined, but it has been found that however carefully albumin is freed from extraneous matter, a certain proportion of metallic substance is found in the ash. For example, white of egg or egg-albumin, when incinerated, yields calcium, and serum-albumin yields sodium, and, perhaps, some potassium. One then may regard egg-albumin as albuminate of calcium, and serum-albumin as albuminate of sodium. Another point lends some support to this view, and that is the relative solubility and measure of decomposition of the two albumins. Serum-albumin is readily soluble and easy of digestion, being broken up by such a weak ferment as papain. Now, as we have just supposed, serum-albumin is a sodium-albumin, and, as is well known, sodium salts are highly soluble. On the other hand, egg-albumin is not readily soluble, and is almost untouched by a weak ferment, such as papain. Egg-albumin we suppose to be a calcium-albumin, and, generally speaking, calcium salts are much less soluble than sodium salts. We might even carry this comparison further, and reflect for a moment on the possible reason why the powerful ferment pepsin has almost no effect on egg-albumin unless a certain proportion of hydrochloric acid be present. The reason may in great part be because the acid is necessary to unlock the calcium salt from its combination with the albumin, and thereby form a soluble calcium salt. On the other hand, an

acid is a less necessary adjunct to pepsin in the digestion of serum-albumin. Further, pancreatin, which is an alkaline ferment, has very little action on egg-albumin, and this may be because it has no action in the way of rendering the calcium base soluble. Contrariwise, pancreatin, the alkaline ferment, acts powerfully on serum-albumin, the sodium-albumin.

Putrefactive Digestion.

When we extend our inquiries into other fields, as, for example, the digestion by putrefaction, we find the comparisons instituted above hold good. Serum-albumin readily yields; egg-albumin is much more difficult of decomposition. This is how Nature safeguards herself, for if the egg were surrounded by a zone of albumin easy of digestion we should find an enormous destruction of eggs by simple putrefactive digestion.

In the experiments I am about to detail I wish to compare the behaviour of egg and serum-albumin in their behaviour towards putrefactive digestion, and more particularly as to the proteoses (albumoses) present. And at the end we can compare these proteoses with those found in papain and pepsin digestions, and with the digestion produced by yeast.

Methods Employed.

In the present investigation hard boiled egg-albumin was employed on the one hand, and dried serum-albumin, prepared from meat, on the other. They were both exposed in the same manner, and as follows: In both, 5 grammes of albumin were employed. The egg-albumin was boiled hard and broken up into a pulpy mass, and mixed with 30 c.c. of water. The serum-albumin, which had been boiled and dried so as to be ready for other experiments, was simply placed in 30 c.c. of water. In order to hasten the digestive process a small particle of dried gelatin containing bacteria, causing liquefaction, was added to each bottle. The gelatin used was prepared by exposing a plate of that substance, newly run, to the air, noting when colonies settled on it, causing softening, at which period it was quickly dried and preserved. By merely exposing the specimens of albumins and water to the air in uncorked bottles at a moderate temperature (25° C.), as I did, one might expect putrefaction and softening to go on, still the immediate presence of bacteria could not but hasten the process, hence the reason for adding the gelatin. The bottles were kept at 25° C. for one week, after which they were simply left in a room for several weeks at a temperature of never less than 16° C. At

the end of that time both albumins were examined. The serum-albumin was quite digested, but the egg-albumin showed a considerable sediment at the bottom of the bottle. A portion of both fluids was thrown on separate dialysers, and the liquids passing through were in both faintly alkaline, and both gave a precipitate with Thresh's alkaloid reagent. With egg-albumin dialysis continued for thirty-six hours, the fluid passing through gives no precipitate with solution of phospho-tungstic acid nor does it give the biuret reaction, so peptone is absent, and probably also deuterio-albumose. From the fact of serum-albumin being more ready of digestion than egg-albumin a portion of the dialysate from the serum-albumin preparation was examined at the end of one hour, when it was found to give no precipitate with solution of phospho-tungstic acid, nor did it give the biuret test, showing absence of peptone.

To confirm this, a portion of the original serum-albumin solution was taken, filtered, and then treated with great excess of ammonium sulphate, allowed to stand over night and filtered. The filtrate was treated with excess of caustic soda solution and a trace of copper sulphate solution, but no reaction took place. At the end of thirty-six hours the dialysate, however, gave a deep pink with the biuret test, pointing to the probable presence of deuterio-albumose, peptone having been just shown to be absent. It is well known that deuterio-albumose can after many hours pass through an animal membrane, more especially if the fluid is slightly alkaline. A portion of the original egg and serum-albumin preparations, after being filtered through paper and boiled, became cloudy, pointing to the presence of some unaltered albumin and globulin. Another portion of the same filtrates (slightly alkaline) gave a precipitate on neutralisation, showing some alkali albumin. With excess of magnesium sulphate the filtrates give cloudy precipitates very small in amount (globulin). On filtering off these precipitates, diluting with distilled water and dividing each into two, one of each with a drop of dilute nitric, gave a precipitate of albumoses. The second portion of each was next treated with dilute acetic acid and excess of sodium chloride, and in both a precipitate resulted (proto- or hetero-albumose or both). Both fluids were largely diluted with distilled water, whereupon both precipitates dissolved. Portions of each were thrown on two dialysers and left for twenty-one days in a very cold place, the water in the outside vessels being changed every day. The egg-albumin preparation only showed the merest trace of precipitate in

the inner vessel (hetero-albumose); thus the precipitate produced by acetic acid and sodium chloride as shown above must be mostly composed of proto-albumose. The case, however, is different when we come to look at the serum-albumin, for the inner vessel contains a bulky precipitate, showing that the acetic acid and sodium chloride precipitate is largely composed of hetero-albumose.

To still further confirm the presence or absence of deutero-albumose the precipitates thrown down by the acetic acid and sodium chloride were filtered off from a portion of both albumins, the filtrates largely diluted with distilled water, and excess of ammonium sulphate added to each. The egg-albumin fluid remained clear (absence of deutero-albumose), while the serum-albumin one showed a precipitate (deutero-albumose). Thus the digestive process due to simple putrefaction is more readily effected in the case of serum-albumin than in the case of egg-albumin, and the albumoses formed would appear to be higher in the series in the former than in the latter.

The absolute alcohol extract was next examined in the following manner: A portion was taken from each bottle, evaporated to dryness at water-bath temperature, treated with freshly-prepared absolute alcohol and filtered, the alcohol evaporated off at ordinary temperature, the resultant again treated with absolute alcohol, filtered, and allowed to slowly evaporate. The extract from both albumins is a yellow mass, that from the egg preparation being the darker. Both extracts are sparingly soluble in ether and chloroform, and the latter agent bleaches the colour very largely. The egg-extract is perceptibly less soluble in ether and chloroform than the serum one. Alcoholic solutions of both extracts give a turbidity with Thresh's (bismuth, etc.) alkaloid reagent. Microscopically both show a few crystals (leucine and tyrosine most probably) with a yellow substance in great abundance in the form of drops, warty crystals, and pentagonal plates. Both extracts are only sparingly soluble in water. The nature of both extracts is probably in great part alkaloidal. The amount of extract from egg-albumin is relatively much smaller than that from serum-albumin. To sum up:—

Egg-albumin gives—
Unaltered albumin,
Alkali-albumin,
Proto-albumose,
Hetero-albumose (little),

Alkaloid and crystals.

Serum-albumin gives—
Unaltered albumin,
Alkali-albumin,
Proto-albumose,
Hetero-albumose (much),
Deutero-albumose (little),
Alkaloid and crystals.

Peptone is absent from both.

PAPAIN DIGESTION.*

Digestion by papain in either acid or alkaline preparations gives—

Proto-albumose	.	.	.	.	} traces.
Hetero-albumose	.	.	.	.
Deutero-albumose	.	.	.	.
					abundance.
Peptone is absent.					

Papain readily digests serum-albumin, but has infinitely less action on egg-albumin.

PEPSIN DIGESTION.

This is perhaps the most complete form of digestion, and we find chiefly the higher albumose, namely deutero-albumose, and strange though it seems, only traces of true peptone; that is, the digestion has gone beyond the proto- and hetero-albumose stage, and only just reached the peptone stage. This applies to both egg- and serum-albumin.

DIGESTION IN PRESENCE OF YEAST.†

In the maturing of koumiss, when the fermentation has been started by the yeast plant, we find the albumin of the milk becomes in part changed into the higher proteids. The digesting agents here are probably the acids which are generated during the alcoholic and acetous fermentations. The peptone stage is never reached, and most probably the bulk of the albumoses produced belongs to the proto and hetero series.

In all these types of digestion we find tyrosin, leucin, urea, etc., none of which interests us at the present time.

In another paper I hope to give the result of some experiments on digestion carried on with sundew (*Drosera rotundifolia*), and also on the behaviour of egg-albumin towards the products of yeast fermentation.

* For further details see under "Papain Digestion" (*Ph. J.*, February 3rd, 1894).

† "Koumiss" (*Ph. J.*, December 24th, 1892).

GENERAL BUSINESS.

Presentation from the Bell and Hills Fund.

The PRESIDENT said that the Bell and Hills Fund existed to enable the Conference to give to each place in which it met some valuable books, to be placed in the library of the local chemists' association. In Belfast at present there was no library in connection with an association, but he hoped after Conference that one would soon be formed. However, the authorities of the Public Library had kindly consented to accept the books, and retain them until the Local Association had a library of their own. He would ask Mr. Payne (as Chairman of the Local Committee) to accept the books, and Mr. Martindale had also been good enough to give a copy of his *Extra Pharmacopœia*.

Mr. J. C. C. PAYNE, J.P. (Belfast), said that as Chairman of the Ulster Association, which had been formed purposely for inviting the Conference to Belfast, he had great pleasure in accepting the books. As they were aware, the invitation extended to the Conference as the united invitation of the Pharmaceutical Chemists of the North of Ireland and of the Chemists and Druggists. It so happened that those two Associations only met in temporary offices, and had no home of their own—that is to say, they had no place in which they could put those valuable books to refer to them at any time. Having consulted together, they decided that the best course to adopt would be to get the books placed in the Free Library. Through the kind offices of Sir James Haslett, who was a member of the Corporation, they were able to prevail upon the Library Committee to accept the books temporarily. These books would be ready for reference during all the hours that the library was open to the public. He had asked Mr. Elliott, the librarian, to come there that afternoon and receive the books. In conclusion, Mr. Payne, on behalf of the Association he represented, expressed the thanks of that body for the valuable present of books from the Bell and Hills Fund.

The Unofficial Formulary Committee.

The PRESIDENT said that letters of resignation from the Formulary Committee had been received from Mr. Groves and Mr. Reynolds. These gentlemen's names were so well known that any attempt to describe their work and their usefulness to the Conference in its earlier days, and down to the present time, would

be superfluous; but he must say that they were very sorry to lose these gentlemen as members of the Formulary Committee. Mr. Groves was getting infirm, and he did not want to keep out younger members; while Mr. Reynolds seemed to have a similar feeling. They felt assured that both gentlemen in the future would help in any way they could the work of the Formulary Committee.

Mr. F. W. BRANSON moved that the following gentlemen of the Formulary Committee be re-elected: W. Martindale, F.L.S., F.C.S.; W. A. H. Naylor, F.I.C., F.C.S.; A. C. Abraham, F.I.C., F.C.S.; T. Greenish, F.C.S., F.R.M.S.; T. Maben, Ph.C., F.C.S.; N. H. Martin, F.L.S., F.R.M.S.; F. Ransom, Ph.C., F.C.S.; Dr. C. Symes, Ph.C., F.C.S.; and R. Wright, Ph.C., F.C.S.; and that Mr. F. C. J. Bird and Mr. Harold Wilson, Ph.C., be elected in the place of T. B. Groves, Ph.C., F.C.S., and R. Reynolds, F.I.C., F.C.S., who have tendered their resignation.

Mr. T. MALTBY CLAGUE, in seconding the motion, hoped the Formulary Committee would have more to do in the year to come than they had had to do for the past year or two.

The election was unanimously agreed to.

Place of Meeting for 1899.

Mr. PARK (Plymouth) said he felt great pleasure, as a delegate from the Plymouth District Association, in inviting the Conference to visit Plymouth next year. It was over twenty years since the Conference paid Plymouth a visit, and he believed they had quite a new crop of pharmacists waiting for the sickle of the Hon. Secretaries to gather them into the granaries of the Conference. Of course, Plymouth could not vie with the great centres of industry that the Conference had lately visited. It could not attempt to vie with either the first, the second, or the third commercial cities in the Empire. They, in Plymouth, could not show the Conference the miles of shipping to be seen in Liverpool, or the miles of ships being built in Belfast; but in Plymouth they could show the members of the Conference a few ships, and at Plymouth they took care when they got the ships to keep them. On behalf of his Association he had to tender their most grateful thanks to the Brighton Association for the kind way in which they had met the Plymouth Association in this matter. They in Plymouth were not aware that Brighton intended to ask the Conference to go there next year, but when Brighton learned that

Plymouth wanted the Conference, Brighton at once waived their prior invitation.

Mr. TURNER spoke in support of the invitation from the Plymouth district. He said that if the Conference saw their way to accept the invitation, a hearty West Country welcome awaited them. He felt that Plymouth would be a great centre for the work of the Conference—that the Conference would leave good results behind—because the enthusiasm of the scientific workers of that Conference would be caught up by the pharmacists in the West of England. They in Plymouth could not hope to extend to the Conference such a magnificent reception as Belfast had given them. In Belfast the Conference had got that true Irish welcome characteristic of the generous Irish character—in fact, it had partaken of a national welcome. They in Plymouth were not in a position to extend such a princely welcome as that. It was not a wealthy city like Belfast; but its old historical associations were of great interest to them all. Plymouth helped to make a page in the history of England, and many people were not slow at present to mark the deeds of the men of the Elizabethan period. He concluded by supporting the invitation to the Conference to visit Plymouth in 1899.

Mr. W. W. SAVAGE (Brighton) said that when Brighton learned that Plymouth was going to invite the Conference, they in Brighton at once recognised Plymouth's prior claim, and thought it their duty to give way, at the same time hoping that the Conference would visit the "Queen of Watering-places" on some other occasion. In the year 1900, he understood, the Conference was going to visit London, and perhaps they might then spare one day to visit Brighton, when he could promise them a day of unalloyed pleasure. The invitation to Brighton was therefore only postponed, not cancelled; and he would ask the Conference by a unanimous vote—their trade was divided enough, without having any divisions among themselves—to decide on going to Plymouth next year. He had great pleasure in moving that

"The place of meeting for the year 1899 be Plymouth."

Mr. BIRD seconded the motion. They would all regret quitting the Emerald Isle and bidding good-bye to the sons and daughters of Erin, but the pain of parting would be alleviated by the efforts being made in advance by their Plymouth brethren—he should have said their brethren in Plymouth—the cordial invitation of the Plymouth district being a foretaste of the joys that were in store for them.

Mr. TURNER said that Mr. Bird need not apologise over "Plymouth Brethren," as it is always understood in Plymouth that the brethren should embrace the sisters.

The PRESIDENT said that as one of those who visited Plymouth in 1877, he could say on that occasion that he had enjoyed the visit to that town very much. He hoped the proposed visit would stir up the members in that district, would increase their members, and that they would have a larger number of papers at the next Conference meetings. He hoped to see a large number from Belfast over at the Conference in Plymouth next year. The Conference did not want to drift into the position that any town or city would be afraid to invite them. Through the lavish kindness of their friends they had got into that position once before; but now, whilst the Conference would be grateful for the courtesies they received, they did not wish unduly to tax the capabilities of any town they may visit.

The motion to visit Plymouth next year was passed amid applause.

ELECTION OF OFFICERS FOR 1898-99.

The following officers were unanimously elected for the ensuing year :—

President.—J. C. C. Payne, J.P., Belfast.

Vice-Presidents.—Walter Hills, Ph.C., F.C.S., London; R. J. Downes, Ph.C., Dublin; John Moss, F.I.C., F.C.S., London; C. J. Park, Ph.C., Plymouth.

Treasurer.—J. C. Umney, Ph.C., F.C.S., London.

Hon. General Secretaries.—W. A. H. Naylor, F.I.C., F.C.S., London; F. Ransom, Ph.C., F.C.S., Hitchin.

Hon. Local Secretary.—J. Davey Turner, Ph.C., Plymouth.

Other Members of the Executive Committee.—Leo Atkinson, Ph.C., London; G. Breeze, J.P., Devonport; F. C. J. Bird, London; H. Collier, Ph.C., London; G. C. Druce, M.A., F.L.S., Oxford; Professor Greenish, F.I.C., F.C.S., London; R. W. McKnight, Ph.C., Belfast; Edmund White, B.Sc., London; R. Wright, Ph.C., F.C.S., Buxton.

Auditors.—D. W. Elliot, Belfast; F. Maitland, Stonehouse, Plymouth.

Votes of Thanks.

Mr. J. L. EWING proposed—

“That the heartiest thanks of the meeting be given to the President, the Rev. Thos. Hamilton, D.D., on behalf of the Queen’s College, for the use of the Library and Examination Hall in which the Reception, the Sessions, and the Adjournments of the Conference have been held.”

Mr. THEO H. WARDLEWORTH ably seconded the resolution.

Dr. FIELDEN, on behalf of Dr. Hamilton, briefly acknowledged the vote, saying it had given the authorities great pleasure to be of service to the Conference.

Mr. MARTINDALE proposed—

“That the Conference expresses the high appreciation of the manner in which Mr. Moss had discharged the duties of Treasurer for the past five years.”

In London, on ‘Change, Mr. Moss was known as “Honest John.” Mr. Umney would now take over the money from Mr. Moss, which was not very much, he (Mr. Martindale) regretted to say, and he felt sure that Mr. Umney would also prove a good Treasurer for the Conference.

Mr. UMNEY seconded the motion, and said he hoped he would be known as “Honest John the Second.”

The PRESIDENT said he was sure they would accept with regret the resignation of Mr. Moss, and he felt assured that the Conference would pass in the heartiest way the vote of thanks to Mr. Moss.

The motion was passed unanimously.

Mr. Moss, in reply, said he should be something more or less than human did he not feel immensely gratified by that handsome acknowledgment of his poor services as Treasurer for the past few years. Within the last few moments they had made him a Vice-President of the Conference, and now they had overwhelmed him with thanks which he felt were utterly disproportionate to the value of the services he had rendered. If he had known some time ago that he would be made a Vice-President—a position of greater ease and less responsibility—he might have quitted the Treasurership some years ago. His connection with

the Conference was not of recent date, as he was at the Plymouth meeting in 1877, but this was not the time for reminiscences. He was not old enough to go into them yet. He desired to thank Mr. Martindale and Mr. Umney for the kind words they had spoken of him, and he thanked the members generally for the cordial manner in which they had received the mention of his name.

Mr. ATKINS proposed—

“That the cordial thanks of the non-resident members be given to the local committee, especially to Mr. J. C. C. Payne (the Chairman of the committee), Mr. McKnight and Mr. Rankin (the Secretaries), also to Dr. Fielden and Mr. Samuel Gibson (Treasurer), for the successful manner in which the various arrangements had been carried out.”

The arrangements had been most carefully worked out in advance, and most perfectly executed in every particular. All present could look back with pleasure upon the right royal Irish welcome they had received in Belfast.

Mr. DRUCE seconded the motion. He said, when it was decided to visit Belfast he had grave doubts about it. There was a stormy piece of sea to cross, and he had pictured Belfast with narrow and uninviting streets, in which the weekly washing would be spread out—and he also thought that an abundant growth of orange would be about. Instead, he found a prosperous city, with wide streets well lighted, and with a magnificent Corporation doing an enormous work in sanitary science. He knew that their sanitation was good, and he understood that the water-supply was not only magnificent, but almost unlimited; but he had not had an opportunity of using it as a beverage.

Mr. PAYNE replied, and in the course of his remarks said he had his first practical experience of the Conference at Plymouth, so that he looked forward to next year, and trusted that he would be able in some measure to do justice to the duties of the Presidency.

Mr. MCKNIGHT was also called upon, and required to proceed from the back of the hall to the platform, when he made a nice speech, saying that he had been afraid up to that moment that the usual vote of thanks would be a vote of censure.

Mr. GIBSON (Local Treasurer) also replied with good feeling; he was especially proud to find so many ladies had attended the meeting.

Mr. STANFORD moved—

“That the hearty thanks of the Conference be accorded to the President for the able and courteous manner in which he had conducted the business of the meeting.”

He had presided over two record meetings, one in Scotland and one in Ireland, and had given immense satisfaction in both cases.

Mr. W. F. WELLS had great pleasure in seconding the vote, and thought the words “able and courteous” were hardly strong enough to meet the case.

The motion was put by Mr. ATKINS as senior Vice-President, who added a few words in support, and was carried by acclamation.

The PRESIDENT, in responding, acknowledged the help he had received from the Executive Committee, the Hon. Secretaries, and the members generally, and expressed his great satisfaction at finding the Conference still retaining so much vigour and enthusiasm. He concluded by moving—

“That a hearty vote of thanks be given to the Honorary General Secretaries, Messrs. Naylor and Ransom, to whose efforts the success of the meetings were mainly due.”

Mr. MARTINDALE seconded the motion, which was carried unanimously—

And was briefly acknowledged by Mr. Naylor and Mr. Ransom. The proceedings of the Conference then terminated.

Mr. PAYNE gave brief announcements regarding the excursion, and at 4.40 the members went to enjoy the hospitality of the Lord Mayor and Lady Mayoress at the Botanic Gardens, which was eminently successful, the weather being all that could be desired.

THE EXCURSION.

The success of the Belfast Conference reached its climax on Thursday, August 11th. About 320 members and their friends left the Northern Counties Railway Station at 9 a.m. for a day on the Antrim coast. The journey to Larne occupied about forty minutes, and on the arrival of the train, coaches were in waiting to convey the party to Garron Tower, a distance of about twenty miles. The grandeur of the coast scenery and the picturesqueness of the villages through which the road passes were much

admired, and to many of the party the district was entirely new. Arrived at Garron Tower, until lately a residence of the Marquis of Londonderry, a substantial lunch was provided, at the conclusion of which the usual toasts were proposed and drunk with enthusiasm. The mansion, which has a magnificent situation on a slight eminence overlooking the sea, has lately been taken by Messrs. M'Neill for use as a hotel, and the Conference party was the first to be entertained under the new auspices. After inspecting the grounds, and being photographed on the slope of a neighbouring hill, the party descended to the coast road, and at about 3.30 p.m. continued the journey by coaches to Glenariff. Arrived at the foot of the glen, most of the company alighted and walked up the narrow gorge which is richly wooded, and, with mountain streams and cascades, forms one of the most attractive spots in the district. From the summit of the ravine a further drive of about twenty minutes brought the party to Parkmore Station, the terminus of a narrow-gauge railway, romantically situated at a high altitude on the moors. Tea was provided in the refreshment rooms, after which the return journey was commenced in a special train of saloon carriages. Belfast was reached at about 9.30 p.m., and members who had had much experience in former years pronounced the excursion to have been one of the most successful that had ever been taken at the Conference gatherings. The weather had been perfect, the local arrangements excellent, and the enjoyment of the day will long remain in the memories of all those who formed the party.

RECEPTION AND CONVERSAZIONE.

The reception by the President and local Committee was held in the Queen's College on the evening of Tuesday, August 9th. There was a large attendance, and a varied programme had been arranged. A demonstration of colour photography by Dr. Fielden, and a lecture on "Interference Phenomena" by Mr. John Wylie, B.A., were much appreciated. An interesting collection of early and rare Irish Herbals was exhibited by Mr. R. M. Young, J.P. Vocal and instrumental music was also provided, and added to the enjoyment of a most successful evening.

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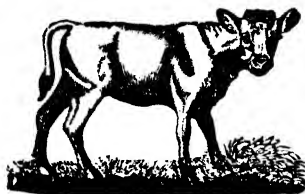
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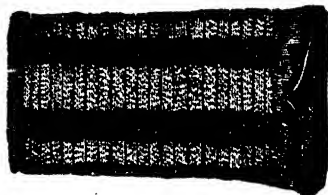


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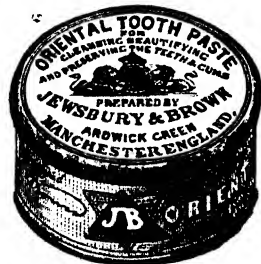
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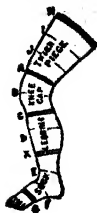
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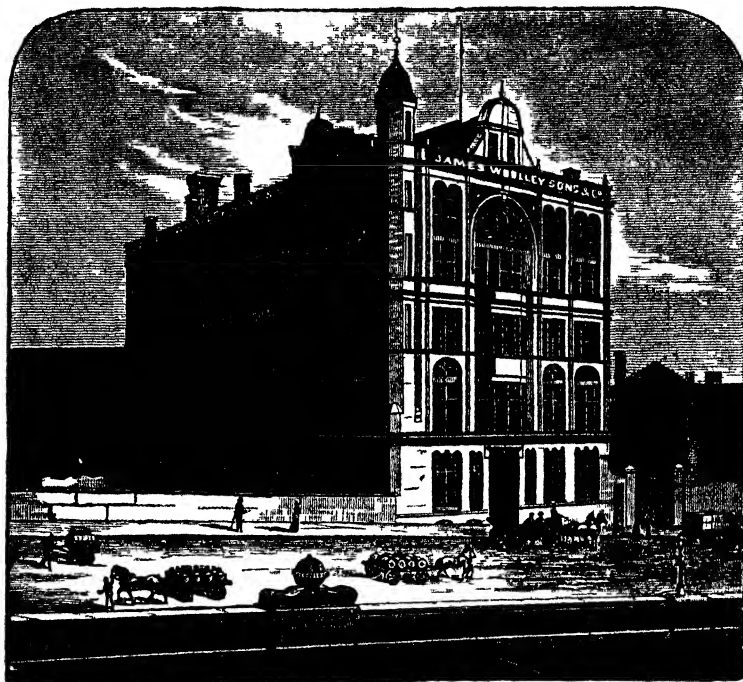
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